

**The Estimation of the Economic Impacts of Industry, Services, Recreational
Activities, Commercial Fishing, and Tourism Associated With the Portion of The
Gulf Intracoastal Waterway from Corpus Christi to Brownsville**

Prepared for

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Galveston, Texas

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The Estimation of the Economic Impacts of Industry, Services, Recreational Activities, Commercial Fishing, and Tourism Associated with the Portion of the Gulf Intracoastal Waterway from Corpus Christi to Brownsville

Executive Summary

The Gulf Intracoastal Waterway (GIWW) provides a vital transportation link for the Lower Laguna Madre region. Several sectors use or benefit from the GIWW (petrochemical industries, transportation services, heavy construction, and agriculture) while others may be adversely affected (such as commercial fishing and recreation). All of these industries or activities have an economic impact on the local economy as well as impacts outside the region. The present study presents estimates of these economic impacts for the Laguna Madre region (which includes Nueces, Kleberg, Kenedy, Cameron, and Hidalgo counties) and the state of Texas.

The initial step in designing the GIWW impact model was the selection of industries/activities to be used in the study. Five categories were developed based on the characteristics of these industries/activities in terms of the extent and manner in which the GIWW is related to the activity.

Categories were defined as industries/activities that are:

- I. dependent on barge transportation:
 - petroleum refining industries
 - chemical industries
 - oil and gas extraction
 - sand, gravel, and other mining and quarrying
 - ship and boat building and repairing
 - rail, motor vehicle, and water transportation and transportation services
- II. benefit from, or are somewhat dependent on barge transportation:
 - agriculture (some commodities, such as sugar and some grains)
 - heavy construction
- III. use the GIWW and are also dependent on water quality and aesthetics:
 - commercial fishing,
 - prepared fish and seafood
- IV. are dependent on water quality and aesthetics:
 - Retail, tourism, and related industries (tourism and recreation)
- V. are largely independent of the GIWW:
 - agriculture (ranching, citrus, and other crops)

This characterization provides a convenient means of understanding the various ways in which important export industries relate to the GIWW and the regional economy. Clearly, the GIWW affects a wide variety of economic activities ranging from recreation

activities for individuals to support of heavy industry. All these activities contribute to the strength of the regional economy.

To estimate these economic impacts of the GIWW related sectors, two input-output models were developed for the Laguna Madre regional economy - one including Nueces County (Total Laguna Madre) and one excluding Nueces County (Lower Laguna Madre) due to the fact that a large portion of economic activity is concentrated in Nueces County. These input-output models were used to estimate multipliers that show the impact of an increase in the sales to final demand of one sector on the value of output of other sectors of the economy (Appendix I). Total regional and state impacts were then estimated in terms of the total value of output, personal income, employment and value added. Detailed impacts are shown in Appendix II.

As a first step in developing the input-output models and economic impacts, direct impacts of these industries had to be identified. Direct impacts (sales to final demand) were estimated for each sector related to the bay and estuary systems as categorized above. A summary of direct impacts aggregated by category is shown in Table ES.1.

Table ES.1 Summary of Estimated Direct Impacts of GIWW Related Economic Sectors by Category on the Laguna Madre Region, 1995.

Cate gory	Sector	Lower Laguna Madre (\$ millions)	% share	Total Laguna Madre (\$ millions)	% share
I.	Oil Extraction, Petrochemicals and Transportation Services	912.54	0.53	1678.24	0.59
II.	Heavy Construction and some agricultural commodities (sugar)	225.57	0.13	336.28	0.12
III.	Commercial Fishing (inshore+offshore)and Seafood Manufacturing	72.35	0.04	99.25	0.04
IV	Water related recreation	170.41	0.11	297.20	0.11
V.	Agriculture	330.44	0.19	395.28	0.14
TOTAL		1,726.55	1.00	2,831.70	1.00

The estimated direct impacts or sales to final demand shown in Table ES.1 provided the basis for estimating the total economic impacts of bay related sectors in the Laguna Madre region. Direct impacts of GIWW related sectors totaled \$2.83 billion in 1995, with Category I industries representing fifty-nine percent of direct impacts in the Total Laguna Madre region.

Total regional impacts by category are shown in Table ES 2. Results show that GIWW related industries and activities have a total impact of \$2.71 billion in total output in the Total Laguna Madre region accounting for and generating a personal income of

\$1.32 billion in 1995. The largest output impacts were generated by the petroleum and chemical industries both at the regional level and state level. However, in terms of employment impacts, the tourism and related sectors had a higher total impact.

These estimates indicate that the GIWW related industries of the region are a significant part of the regional economic base. An estimate of the relative importance of the bay related industries can be made using employment. Estimated GIWW related employment for the Total Laguna Madre region (57,533) was about one fifth of the reported total employment in the region in 1995 (Table ES.2).

Industries that are wholly dependent on barge transportation (Category I) generated the largest impacts in the region. \$2.83 billion in output, \$538.77 million in personal income, and \$1.13 billion in value-added impacts were generated by this group of industries. A total of 17,920 jobs were created through these sectors in the Total Laguna Madre region in 1995 (Table ES.2).

Agriculture (except sugar) was the second largest contributor to the regional economy with a total output impact of \$718.12 million, value-added impact of \$409.93 million, and personal income impact of \$237.08 million in the Total Laguna Madre. Agriculture generated 15,041 jobs in the region (Table ES.2).

The tourism and recreation related sectors (Category IV) ranked third among all categories in total employment generated within the region with an estimated 11,615 jobs, accounting for just over twenty percent of GIWW related employment in the Total Laguna Madre region. As earlier indicated, this sector is an aggregation of several service and retail businesses that provide services and goods to recreationists and tourists. This employment estimate includes the direct employment in those businesses as well as jobs created in related businesses that provide them with supplies, materials and goods (Table ES. 2).

From the results of this analysis, it may be stated that, on average, each dollar of tourist and recreationist expenditures resulted in about \$1.80 in total value of output, \$0.69 of personal income, \$1.10 of value added in the Laguna Madre regional economy. In addition, an employment multiplier of about 39 jobs per million dollars of tourist and recreationist expenditures is indicated by the analysis.

Category III industries, which include commercial fishing and seafood manufacturing, generated \$167.61 million in the Total Laguna Madre region for inshore+offshore commercial fishing. Employment impacts were estimated as 1,782 jobs for the region which accounts for about three percent of all employment for the Total Laguna Madre region (Table ES. 2.). The relatively low estimated employment and income impacts from commercial fishing may be related to the unique employment practices in this industry.

Statewide impacts represent the estimated impacts of GIWW related industries on the state economy. These impacts are presented in Table ES. 3. Jobs created at the state level were estimated to be 58,783, generating an additional 1,250 jobs elsewhere in the state. Total impacts on personal income at the state level were \$1.43 billion, representing an additional \$168.52 million in personal income generated outside the Laguna Madre economy. In terms of output, GIWW related industries generated an additional \$298.23 million at the state level in 1995.

Table ES.2 Total Economic Impacts of GIWW Related Industries by Category on the Laguna Madre Region, 1995.

Category	Output (\$millions)		Personal Income (\$millions)		Value-Added (\$millions)		Employment (jobs)	
	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
I. Heavy Industry and Transportation Services	1,469.31	3,059.12	341.79	668.37	631.23	1315.43	13,185	22,909
II. Heavy Construction and Agriculture (Sugar)	2,74.15	366.87	88.76	117.50	146.68	195.34	5,451	6,187
III. Commercial Fishing and Seafood Mfg.	116.89	167.61	21.33	30.96	41.29	59.45	1,243	1,782
IV. Recreation related industries	289.79	534.30	112.69	204.56	178.56	323.96	6,605	11,615
V. Agriculture (all except sugar)	562.53	718.13	191.56	237.06	320.76	409.94	12,999	15,040
TOTAL	2,712.67	4,846.03	756.13	1,258.45	1,318.52	2,304.12	39,483	57,533

Table ES.3 Total Economic Impacts of GIWW Related Industries by Category on Texas, 1995.

Category	Output (\$millions)		Personal Income (\$millions)		Value-Added (\$millions)		Employment (jobs)	
	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
I. Heavy Industry and Transportation Services	1,640.01	3,048.80	351.11	662.75	692.20	1,312.83	10,514	19,162
II. Heavy Construction and Agriculture (Sugar)	420.35	622.73	174.95	270.16	269.54	408.63	8,222	11,175
III. Commercial Fishing and Seafood Mfg.	125.98	172.94	27.75	37.96	56.73	77.39	1,251	1,790
IV. Recreation related industries	331.75	580.39	134.12	223.85	206.21	358.63	6,605	11,615
V. Agriculture (all except sugar)	558.17	719.40	191.30	232.25	367.30	439.25	12,999	15,041
TOTAL	3,076.26	5,144.26	879.23	1,426.97	1,591.98	2,596.73	39,591	58,783

*In the estimation of total statewide impacts, multipliers for some sectors were smaller than the study area regional multipliers. Conceptually, this should not occur. This problem was encountered only in a few sectors where most activities are local and service oriented, and only for employment multipliers. This phenomenon might, therefore, be attributed to the fact employment impacts of these industries are largely confined to the regional economy. Whenever a smaller multiplier was encountered at the state level, multipliers for the region and state level were assumed to be the same, and regional multipliers were used.

Results show that among the GIWW related sectors, the petrochemical industries and transportation services (Category I) had the largest impact on the Laguna Madre economy in 1995. These industries are also the primary users of the GIWW along the Corpus Christi-Brownsville corridor. Since about sixty-three percent of output is generated by firms in Category I, a closure of the GIWW may have an adverse effect on the economy, since other modes of transportation appear to be more costly. One main concern would be feasible alternative transportation modes for refined petroleum shipped from Corpus Christi to the Rio Grande Valley region (Fuller and Fellin, 1998). On the other hand, tourism and related sectors generated large employment impacts (twenty percent of all employment); even though their output was smaller compared to the Category I industries, representing about eleven percent of total output in the region. A review of literature reveals that the GIWW affects tourism and recreation in various ways. From an economic standpoint, several positive effects (eg. access to fisheries) may be identified. Other studies suggest that dredging and other anthropogenic activities along the GIWW may threaten the sustainability of certain species.

This study does not analyze the effects of the GIWW on any of these sectors, but provides information on the potential relative economic impacts of sectors related to the GIWW. A separate report as part of this project looks at costs of alternative modes of transportation (Fuller and Fellin, 1998).

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1. Introduction

1.1. Purpose of the Study

The purpose of this study is to estimate economic impacts of sectors related to the section of the Gulf Intracoastal Waterway (GIWW) from Corpus Christi to Brownsville (hereafter the Laguna Madre region). The study is intended to provide an analysis of the regional economy that may be used in decision making for the Interagency Coordination Team and other interested parties on the possible implications of a closure of the GIWW. The study presents relative economic impacts of the industry, manufacturing, and service sectors associated with the GIWW on the region and the state in terms of output, personal income, value-added, and employment.

Assessing the economic impacts of industries and other economic activities related to the GIWW is crucial in the valuation of the impetus they provide for the local, regional, and state economies. An increase in the output of each economic activity generates direct economic impacts in terms of employment and income, has secondary impacts on sectors that supply inputs to these industries/activities, and results in consumption effects generated by increased incomes. Since the Laguna Madre region is an integral part of the larger state economy, these impacts are manifested not only at the local site of occurrence but extend into the state economy as well.

The GIWW is associated with a wide range of economic activity in the region. Some economic activity is wholly dependent on the GIWW while others may be adversely affected by the GIWW. In the Laguna Madre region, like any coastal region, the human activities supported vary significantly in their nature and economic characteristics. These include industries that produce goods and services from the resources of the bays and estuaries to be sold in private markets. Other human uses do not extract or consume bay and estuary resources, but rather depend upon the quality and quantity of resources to attract non-consumptive activities such as boating, fishing, and other recreational activities. By and large, the benefits of these activities do not flow through private markets.

Important sectors that produce goods for private markets and use the GIWW for their business include the petroleum refining and chemical industries, agriculture, and commercial fishing. Each of these are examples of industries that contribute to the local

economy by converting the region's resources into consumer goods and exporting them to other regions. Given sufficient data, the regional economic value of these industries may be calculated in a straightforward manner. Often this value is expressed in terms of regional sales or some economic variable reflecting its worth as determined by the private market.

Other uses of the Laguna Madre region's resources that are equally important include the non-consumptive and common property uses such as recreation and tourism. For these activities, there exists no organized market by which these uses may be marketed on a per-unit basis. Open access of bay and estuary waters, beaches, and general aesthetics of the coastal region are by their inherent nature public goods that are shared by users without exclusion. While there is no doubt about the value of these public goods, that value cannot be expressed through private market exchanges.

Given this lack of organized markets, economic values of public uses of bays and estuaries are generally unknown and the economic impacts of these resource uses in their natural state are undervalued. In order to achieve a comprehensive analysis of human uses of bay and estuary resources, economic impacts of all uses are identified and estimated in this study.

This study first identifies the industries and activities that use the GIWW or are affected by the existence of the GIWW, and then classifies these into categories according to the nature of the relationship of each to the GIWW. Estimates are made of the direct impacts on the regional economy of each industry or activity in terms of regional sales or expenditures. Then, economic impacts are estimated using an input-output model, which provides results on the regional and state level impacts of these industries/activities.

The economic impacts estimated in this study are business values, such as income generated, employment, or sales. These business values are useful in determining the effects of a change (increase or decrease) in output of one of the GIWW related industries or activities on the output, employment, and income of the other sectors in the regional and state economies, including the effect of increased household incomes.

1.2. Organization of the Report

The following portion of the report is organized in four main sections. These are:

- An overview of the GIWW and its importance in transportation in the Laguna Madre region
- Economic impact analysis
- Estimation of direct impacts
- Regional and statewide Impacts
- Conclusions

2. Overview of the GIWW and the Laguna Madre region

2.1. The GIWW and its importance in transportation in the region

Several commodities move along the GIWW between Corpus Christi and Port Isabel. The movement of commodities is mostly from Corpus Christi to Port Isabel, but there are substantial amounts of sugar and crude oil moving along the GIWW toward Corpus Christi. The bulk of the shipments are of gasoline, fuel oils, and chemicals. Steel, sand and gravel, and chemical fertilizers are also important. Most of this originates in Corpus Christi but commodities also move along the Mississippi River (such as steel) to be transported to the Rio Grande Valley via the GIWW, much of which is destined to the maquiladoras in Mexico. About eighty percent of gasoline demand in Brownsville is supplied by barge shipments on the GIWW. This is about one fourth of all petroleum shipments by barge from the Corpus Christi area. Although the total tonnage shipped by barge on the Corpus Christi-Brownsville reach of the GIWW is not larger when compared to other segments of the GIWW other modes of transport (e.g. pipeline), it is clearly significant to business operations within the regional economy. This is especially true in the case of refined petroleum products. At the present time, feasible transportation alternatives seem to be severely limited. The evaluation of alternative transportation possibilities is developed fully in a separate report prepared for this project (Fuller and Fellin, 1998).

2.2. Description of the Study Area

The study region includes Cameron, Hidalgo, Kenedy, Kleberg, Nueces, and Willacy counties including the cities of Brownsville and Corpus Christi. In 1995, the population of the area was 1.13 million, which accounted for about one-fifth of the population of Texas. Nueces county ranked first in economic activity in the six county region with employment of 130,985 in 1995. Per capita wage in the region was about \$19,883 in 1995.

The area is unique in that economic activity is concentrated in the northern (Nueces county) or southern extreme (Cameron and Hidalgo counties). Employment in these counties represent ninety-five percent of all employment in the region. The petroleum refining industries are largely concentrated in Nueces county. Agriculture, apparel manufacturing industries, and health services are important in Hidalgo and Cameron counties (TWC, 1996). In the counties adjacent to the GIWW along the 117 mile reach between Corpus Christi and the Rio Grande Valley, land is primarily devoted to extensive ranching, crop production, or is vacant of economic activities.

The Laguna Madre estuary region is a popular destination for water related recreation activities, including the Corpus Christi bay area in the north and South Padre Island resort area in the south. Baffin bay and other areas of the Laguna Madre are popular sport fishing destinations. The commercial fishing industry is small relative to

other bay systems of the state, but includes the Upper and Lower Laguna Madre bay systems, which account for twenty five percent of all finfish caught in Texas bay systems (Figure 2.1).

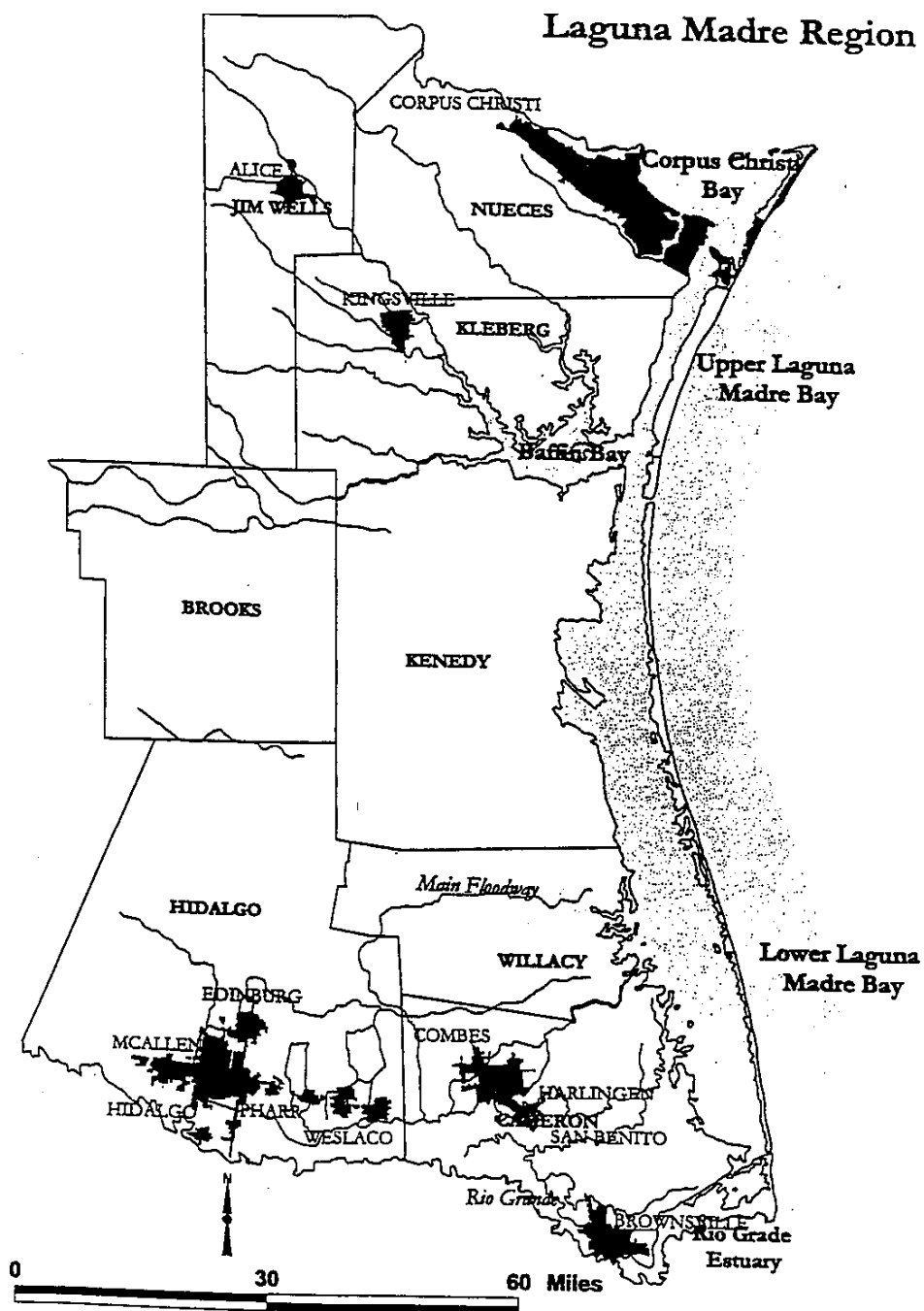
Due to the size of economic activity in Nueces county, two study areas were defined- one with (Total Laguna Madre Region) and one without Nueces county (Lower Laguna Madre Region).

Table 2.1. Employment, Wage, and Population in the Total Laguna Madre Region, 1995.

	Employment	Annual Payroll (\$000)	Population
Cameron	70,981	1,214,005	309,578
Hidalgo	97,231	1,598,821	479,783
Kenedy	259	5,535	442
Kleberg	10,140	189,604	30,629
Nueces	130,985	3,162,763	312,708
Willacy	2,378	32,318	19,500
TOTAL	311,973	6,203,046	1,132,698

Source: Texas Workforce Commission (TWC) and the US Bureau of the Census, 1996.

Figure 2.1 Map of the Laguna Madre region.



3. Economic Impact Analysis**3.1. Literature review****General Literature on Economic Impact Analysis**

The literature for general economic impact analysis was confined to input-output models, and only to most recent literature. A comprehensive treatment of input-output analysis can be found in Leontief. Midmore and Miller give a good background on input-output models. Dewhurst et. al include some new developments in regional input-output modeling, and address issues in modeling and interpretation. Archer (1995) discusses some data issues in tourism and important considerations in survey design.

Input-output models are used in the analysis of economic impacts of tourism (Archer and Fletcher, 1990, 1996). A discussion of tourism multipliers can be found in Archer (1977). Input-output models have also been used in tax policy reform, agricultural sector studies, planning, and other applications.

Economic Impact Literature on the GIWW

The most recent study on economic impacts of the GIWW is by the Texas Transportation Institute (TTI) (Hardebeck et al., 1997) which is an update of an earlier study by the TTI (Garrett and Burke, 1989). The study examines economic impacts of barge transportation along the Texas Gulf Coast and evaluates the feasibility and potential benefits of the extension of the GIWW to Mexico. Total economic impact attributable to the GIWW was estimated as \$4.8 billion in demand, about \$190 million in total income and 13,490 jobs. Economic impacts of other sectors related to the GIWW were not included. A study on the economic impacts of a closure of the GIWW along the Laguna Madre was conducted by the TTI in 1994 (Roop and Dickinson, 1994). The study concludes that the GIWW is not only beneficial to the economy of the region but also to the environment in terms of improved salt water circulation, facilitation of the movement of fish, and the reduction of fish kills. They also report that the GIWW handles 350,000,000 gallons of gasoline and diesel fuel for the Valley and that it would take 20,000 railcar loads and 80,000 truck loads to replace the commodities transported through the GIWW. Barge transportation is also safer and less polluting than other forms of transportation (Roop and Dickinson, 1994).

Other studies on the impacts of the GIWW include a study by Diaz (Diaz and Kelly, 1994). The study recommends the abandonment of dredging in the Laguna Madre region because of seagrass loss, contamination in the food chain, hazardous spills and other environmental reasons. Economic impact on sectors associated with the environment such as recreation and other activities are not estimated but results from earlier studies are used.

3.2. Export Base Theory: Export and Residentiary Industries

The purpose of this study is to provide an economic impact analysis on the Laguna Madre region of the industries and activities that are related to the GIWW. Before moving into the details of data collection and analysis, this section provides a brief description of the concepts from regional economic theory on which the analysis is based.

Economic impact analysis is based upon a regional economic development concept typically referred to as “economic base” or “export base” theory (Richardson). This theory states that the growth of a region is initiated by and depends primarily on its ability to produce goods and services that are “exported” from the region. Hence, the industries or sectors of a regional economy may be divided into two groups. These are; (1) export sectors and (2) residentiary sectors. Export sectors are those that produce goods and services that are sold outside the region, thus stimulating the inflow of new money into the region. It is this group of industries that provide the stimulus for growth when demand for their products is expanding and also cause a decline in economic activity within a region when export demand slackens. Since the primary factor in placement within this group is that production and sales cause new money flows into the local region, “exports” may be defined quite broadly and typically include the following industries:

- Agriculture
- Mining
- Manufacturing
- Non-Residential Construction
- Tourism
- Federal Government
- State Government

Residentiary sectors are those that produce goods and services primarily for local markets and consumers within the region. While the demand for goods and services of these sectors of the economy is viewed as dependent ultimately upon the success of export sectors, their role in economic growth of a region is no less important. The primary function of residentiary industries is to provide goods and services to the export industries of the region and to their employees and families. The group of residentiary industries typically consists of:

- Business Services
- Personal Services
- Wholesale Services
- Retail Services
- Financial Institutions
- Local Governments

- Residential Construction
- Transportation/Communications/Utilities

This classification implies a cause and effect relationship that flows throughout the local economy. That is, new income and employment derives from the sale of goods and services to parties outside the local region which, in turn, creates the local business and personal demand for the goods and services provided by residentiary industries. Hence, the total income and employment of the region is derived from export industries and expanded by residentiary industries. This expansion is sometimes called the multiplier effect which will be addressed in more detail later in this report.

As local export industries increase their output and thereby generate more employment, income and demand for goods and services of local residentiary businesses, some economic impacts flow to other regions. Clearly, not all the demands for production inputs by export industries can be met by local residentiary businesses. Likewise, some goods and services demanded by employees and their families are not available locally, or these consumers decide to make purchases outside the region. Imports into the local region to serve these needs means that some money flows out of the region, thereby creating economic impacts elsewhere. In this study, estimated economic impacts falling outside the Laguna Madre area are limited to those occurring within the state of Texas.

One note of caution is in order relating to the classification of local businesses as either export or residentiary in a regional economic analysis. While this classification facilitates the economic impact analysis, it is clear that in some cases a specific industry may be one or the other, or both. For example, consider the retail sector of a local economy. Retail stores exist primarily to serve local residents in a typical city. However, the construction of a large shopping mall with retail stores of many varieties may cause shoppers to travel from remote areas whose purchases would constitute an export activity.

Numerous other examples could be given relating to medicine, construction, financial centers and so forth. For this study, industries are classified based on their primary function in the economy-either export or residentiary. Since the classification also relates to human uses of the GIWW, misclassification does not appear to be a significant problem.

3.3. Input-output Analysis

Input-output models originated with the work of Wassily Leontief on a general theory of production based on economic interdependence among producing sectors of the economy. Input-output models follow a general equilibrium approach, and have been useful in analyzing the aggregate economy because of their ability to show what the effect of a change in one sector will have on all other sectors of the economy. Input-output models have been used in forecasting, planning development, and analysis of technical change.

An input-output model calculates multipliers which show the impact of an increase in the output of one sector on other sectors. There are several multipliers, depending on the economic variable of interest. These include:

The output multiplier which is an estimate of the change in total output (business sales) by all sectors within the regional economy that results from a change in sales to final demand by one particular sector in the economy.

The employment multiplier which estimates the change in total employment (all jobs) throughout the regional economy that results from a change in sales to final demand by a given sector.

The total income multiplier which is an estimate of the change in total household income from all sources (wages, salaries, profits and rents) resulting from a change in sales to final demand of a given sector.

The value added multiplier which is an estimate of the change in total, regional economic returns from the employment of all resources of production in the economy from a change in sales to final demand by a given sector. Value added is the same as the value of all goods and services produced within the Laguna Madre region and is analogous to Gross Domestic Product as reported at the national level. Hence, value added within a region may be referred to as Gross Regional Product.

Multiplier estimates are expressed as the impact on a selected economic variable of a one dollar change in final demand. It is assumed that the functional relationship to final demand is linear so that the multiplier may be used to estimate the impact of larger sales to final demand by any given sector in the economy.

The notion of multipliers rests on the difference between the *initial* effect of a change in final demand and the *total* effects of that change. The total effects can be defined as the sum of *direct and indirect* effects (which does not include the effects generated by the increase in household incomes) or *direct, indirect, and induced* effects (which includes the effect of increased household incomes on the economy) (Miller). Impact estimates in this study are of the latter definition.

In this study two regional input-output models were constructed using IMpact analysis for PLANning (IMPLAN), which is a large computer algorithm of a system of equations, each representing a sector of the economy and identifying the interrelationships among sectors. The system shows the interdependence of all sectors of the economy by capturing the intermediate sales among sectors, as well as sales to households, exports and other components of final demand. Using IMPLAN, input-output models may be developed for any county in the US or, by aggregation within the database, any group of counties to form a regional impact analysis (Olsen et al., 1993).

The two input-output models, developed for the study area use the direct impact estimates from each of the bay related economic sectors as a starting point for estimating total economic impacts. Through the set of equations that reflect the integration of all sectors of the economy, multipliers for four economic variables are estimated. Each of these provide insight into the economic impacts or derived from the use of the GIWW by

each of the related sectors of the regional economy.

Like any economic model, input-output analysis is limited by its assumptions and by the accuracy of the endogenous equations, as well as the data on exogenous variables that drive the model. Input-output analysis is limited by several assumptions. These include: (1) categorization of individual firms by their primary products, (2) the linearity of all equations in the model, (3) the assumption of proportionality of output to inputs, and (4) fixed prices and technology.

3.4. Characterization of the Laguna Madre Regional Economy

The first step in estimating direct economic impacts is the classification of regional industries into export and residentiary groups. The primary focus of the impact analysis is on the export industry groups and their direct economic impacts, defined as the annual amount of sales or other sources of income flows into the region. Of particular interest in this study was identifying those export industries that are related to the GIWW and understanding the nature of that relationship.

The initial step in designing the GIWW impact model is the selection of industries/activities to be used in the study. Five categories were developed based on the characteristics of these industries/activities in terms of the extent and manner in which the GIWW is related to the activity.

Categories were defined as industries/activities that are:

- I. dependent on barge transportation:
 - Petroleum refining industries
 - Chemical industries
 - Oil and gas extraction
 - New mineral extraction facilities construction
 - Sand, gravel, and other mining and quarrying
 - Ship and boat building and repairing
 - Rail, motor vehicle, and water transportation and transportation services
- II. benefit from, or are somewhat dependent on barge transportation:
 - agriculture (some commodities, such as sugar and some grains)
 - construction
- III. use the GIWW and are also dependent on water quality and aesthetics:
 - commercial fishing,
 - prepared fish and seafood
- IV. are dependent on water quality and aesthetics:
 - Retail, tourism, and related industries (tourism and recreation)
- V. are largely independent of the GIWW:
 - agriculture (ranching, citrus, and other crops)

This characterization provides a convenient means of understanding the various ways in which important export industries relate to the GIWW and the regional economy. Clearly, the bays and estuaries provide significant amenities to a wide variety of economic activities ranging from recreation activities for individuals to support of heavy industry. All these activities contribute to the strength of the regional economy.

Other Economic Activity in the Region

There are other forces of growth in the region such as retirees from other states who live in the region for several months during the winter (Winter Texans), non-marine government, export-import trade with Mexico, and other autonomous investments. One the most important of these forces may be the Winter Texans. Although Winter Texan travel is not identified separately in this study due to lack of complete information, it is included in overall tourism related sectors' impacts. A recent survey documents valuable information on Winter Texans but does not include expenditure categories of this group or how many travel to the Laguna Madre area. (Vincent, et. al.)

Highlights of the survey show:

- An estimated 97,000 Winter Texans were in the Valley (this information excludes those living with family or in their own housing)
- Retirees (typically from the Midwest) spend about \$700 to \$1000 per month on living expenses and their average income is in the \$30,000 to \$34,000 range.
- Direct impacts of Winter Texan travel in 1994-1995 tourism season were estimated as being \$250 million to the Valley economy.

4. Estimation of Direct Impacts

Activities in the economic sectors associated with the GIWW provide economic benefits to the economies of the local region where these activities occur as well as throughout the state. These economic impacts can be classified into direct and secondary impacts. The impacts on a regional or state economy are measured by total output value, employment or total income paid by a sector. Direct impacts estimation for industries such as industry and agriculture are straightforward since their output and employment figures are readily available in published series. However, not all sectors' direct value of output or sales can be measured directly. Estimation of economic impacts for recreational activities is not so straightforward. Non-consumptive use sectors such as boating, birdwatching, and other recreational activities do not have immediately measurable economic values associated with them. However, their contribution the local economies is significant as spending in these activities generate income for local economies. These direct impacts also have secondary impacts on regional and state economies. To estimate secondary impacts of these activities, direct expenditures have to be estimated and then allocated to sectors that exist in the standard industrial classification (SIC) to match up with the input output model.

In addition, care must be taken to assure that the direct impact estimates are accurate and comparable in terms of date, area covered and industry contribution to the economy. Table 4.1 shows the variables used as direct impact estimates for the export sectors classified as related to the GIWW.

Table 4.1. Direct Impact Measures for Export Sectors in the Laguna Madre Region

Sectors	Direct Impact Measure
Heavy Industry and Manufacturing	Sales to final demand
Commercial Fishing	Total ex-vessel value of catch
Recreation and Tourism	Travel expenditures within the region
Agriculture	Cash receipts from sales

4.1. Data Sources

For direct impacts, the following sources of data were utilized:

- Texas Workforce Commission (TWC) wage and employment data for all industry classifications by county, for 1993-1995
- IMPLAN data for 1990-1992-1994, which has output and employment data for each industry matched by industry classification numbers
- Texas Department of Commerce (TDOC), Tourism Division data which has travel expenditures by county 1993-1995, as well as expenditures on different spending categories.
- Texas Agricultural Extension Service (TAEX), Estimates of Value of Agricultural Production by County, 1993-1995
- National Marine Fisheries Service (NMFS), which includes shrimp values by county and by area caught from 1993-1995
- Trends in Texas Commercial Fishery Landings, 1972-1995, by Robinson, Campbell, and Butler, published by the TPWD, which includes data on fish species and ex-vessel values for each bay system and Gulf grid zone for the GIWW area
- D.K. Shifflett and Associates Ltd. (D.K.S.&A Ltd.) Directions® Performance/Index Survey made available by the Texas Department of Commerce, Tourism Division. These data have business and leisure travel expenditures per person day and other related travel data and water-related recreation information for the Laguna Madre region.

In what follows, estimation of direct impacts in previously identified sectors are explained in detail. These direct impacts were then used in the IMPLAN model to estimate secondary impacts.

4.2. Heavy Industry, Manufacturing, and Transportation Services

Measured in terms of value of production, sales or employment, heavy industry and manufacturing are the largest components of the Laguna Madre area economy. For the most part, business volume of these industries depend on the use of the bay's transportation and navigation facilities, the ship channel to the Gulf of Mexico and the GIWW. The exception to this generalization is the ship and boat building industries whose business either totally or partially depend upon water and habitat quality in the bays and estuaries of the Laguna Madre area. Transportation of petrochemicals, including products ranging from imported oil to finished petroleum and chemical goods, is the single largest industrial use of the bays and estuaries in the area.

Table 4.2 shows employment and annual wages in the industry and manufacturing sectors in the Laguna Madre region in 1995. The difference in employment and wages is significant when Nueces county is included. Employment in heavy industry and manufacturing is about one-fifth less without Nueces county. In order to look account for direct impacts for each case, two separate regions were defined as the study area-with and without Nueces County.

Table 4.2. Employment and Wages for Heavy Industry and Transportation Sectors in the Laguna Madre Region, 1995

Sector	Employment		Wages	
	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
	(jobs)		(\$000)	
Oil and Gas Extraction	431	2,490	19,613	104,498
Mining and Quarrying	9	67	2,306	1,963
Heavy Construction	528	5,303	9,940	135,309
Chemicals and Allied Products	229	2,400	4,471	122,882
Petroleum Refining and Related Industries	35	3,154	965	164,737
Ship and Boat Building and Repairing	724	716	15,890	15,523
Transportation and Transportation Services	2,597	5,504	54,454	129,902
TOTAL	4,552	19,632	105,563	677,814

Source: TWC, 1997.

Petroleum Refining, Chemicals, Oil and Gas Extraction, and Transportation Services

Petroleum refining has been an important sector in the Laguna Madre area ever since oil was discovered in the Coastal Bend region of Texas. Although there has been a decline in oil production since the 1970's, petroleum refining and petrochemical production has continued to grow as processing has utilized imported oil from outside the region as a source of input. With continued dependence on imported oil in the US, refining in this area may be expected to increase. This industry is one of the main users of the GIWW since about eighty percent of the gasoline demand for the southern section of the region is supplied by ocean barge shipments using the GIWW (Fuller and Fellin, 1998).

Petroleum refining and related industries employed over 3,000 workers in 1995, nearly all in Nueces county (Table 4.2). Oil and gas extraction and chemical industries are also important and depend on the GIWW. Many offshore drilling installations use the GIWW for transportation of machinery and equipment. However, these industries along with the petroleum refining industries are concentrated in Nueces county, and the definition of the study region with and without Nueces county takes this fact into account. Including Nueces county, employment in the oil and gas extraction sector was about 2,490, whereas in the Lower Laguna Madre region, this sector employed about 431 workers (Table 4.2).

Transportation and transportation services are included in this study as their business is directly affected by the existence or non-existence of the GIWW. Railroads and related services, motor freight transport and warehousing, water transportation, air transportation, pipelines, and transportation services are all included in this group.

Heavy Construction

Heavy construction was included in this study as a GIWW related industry because of the importance of off shore oil and gas extraction. Construction of platforms and drilling equipment to serve the development of oil and gas wells in the bays and estuaries, as well as further offshore are a significant part of the heavy construction industry in the study area. Other heavy construction was also included as the GIWW is used to transport construction materials such as sand and gravel. TWC data shows that the heavy construction sector accounted for 5,303 jobs and \$135.31 million in wages in the area (including Nueces county) in 1995 (Table 4.2).

Mining

Mining activities include stone, gravel and chemical mining which are included in the GIWW related sectors. While the size of this industry is not large as compared to that

of oil and gas extraction, it does use water transportation as a means of moving its products, especially along the GIWW.

Ship and Boat Building and Repairing

The Ship and Boat building industry is directly related to the GIWW as it supports off shore petroleum extraction, transportation of gasoline and other commodities as well as the commercial fishing industries along the GIWW. Moreover, sport fishermen and other boating recreationists depend upon this sector for repairs and other services.

Seafood Manufacturing

Also classified as manufacturing is the preparation and processing of shrimp, fish and other seafood. In the Laguna Madre study area, this industry is made up primarily of frozen seafood. This manufacturing industry is closely linked to commercial fishing in the area.

Direct Impacts for the Industry and Manufacturing Sectors

Direct impacts of the industry and manufacturing sectors are measured as regional sales to final demand. As indicated, sales to final demand include those activities that generate new money flows into the regional economy, namely exports, sales to consumers, sales to government and expenditures of visitors to the region for recreation, tourism or other purposes.

Data on sales to final demand were obtained from IMPLAN and the latest available date for these data was 1994. The average annual change in the Producer Price Index (PPI) was used to project the 1995 final demands. Average annual percentage change of the PPI from 1994 to 1995 was 3.4 percent. Projected 1995 final demands are presented in Table 4.3.

Table 4.3. Final Demands for Industry, Manufacturing, and Transportation Services in the Laguna Madre Region, 1995*.

Sector	Lower Laguna Madre	Total Laguna Madre
	(\$ millions)	
Oil and Gas Extraction	6.68	29.25
Sand, Gravel and other quarrying	0.97	1.41
Heavy Construction		
New Highways and Streets	69.29	109.16
New Mineral Extraction Facilities	64.45	134.78
Miscellaneous Food		
Seafood manufacturing	6.92	10.29
Miscellaneous Food Preparations Except Seafood	65.53	90.01
Chemicals and Allied Products		
Aggregate Chemical Products	189.06	482.11
Petroleum Refining and Related Industries	484.71	791.80
Ship and Boat Building and Repairing	10.06	15.22
Transportation and Transportation Services		
Railroads and Related Services	16.61	24.92
Motor Freight transport and warehousing	72.13	111.75
Water Transportation	28.98	50.19
Air Transportation	91.73	155.80
Transportation Services	8.41	8.76
Pipelines, except Natural Gas	3.2	7.03
TOTAL	1,118.73	2,022.50

* Projected for 1995 from IMPLAN, 1994 and the Producer Price Index

Estimated final demands for the industry, manufacturing, and transportation services show that these sectors generated total sales to final demand of about \$1.12 billion in the Lower Laguna Madre and \$2.02 billion in the whole region including Nueces County. As mentioned above, the petrochemical industries, oil and gas extraction, and heavy construction is concentrated in the Upper Laguna Madre, and these sectors constitute the greatest portion of the difference in the final demands of the Lower and Total Laguna Madre regions.

4.3. Commercial Fishing

The Laguna Madre estuary includes the Upper and Lower Laguna Madre bay systems (Figure 2.1). Commercial fishing in the area is composed of two distinct activities: bay fishing (inshore) and gulf fishing (offshore). Bay fishing primarily consists of smaller

boats that sell their catch at points of landing in the local area. Gulf fishing uses larger commercial boats that may fish over a wide expanse of the Gulf of Mexico. Gulf boats fishing the waters off the Laguna Madre estuary may sell their catch locally or outside the region. Likewise, gulf boats fishing in areas remote from the Laguna Madre estuary may land fish and shrimp in counties within the estuary.

Estimation of Direct Impacts

Total value of commercial fishing in the area was estimated using data from Robinson, et al. and the National Marine Fisheries Service (NMFS). Data from Robinson et. al. were used to estimate the total value of inshore and offshore finfish and shellfish, and inshore shrimp. Since offshore landings for shrimp are reported only as a total for the state of Texas, a weighted allocation scheme was developed to allocate the total to each estuary. This approach represents the production capacity of the estuary system and economic impacts created by this capacity, even though the catch may have landed elsewhere. In other words, it represents the economic impacts generated by fish and shrimp caught in bay and estuary waters, which reflects the potential economic impact of fish and shrimp spawned from estuaries.

However, from a current economic point of view, it is important to estimate economic impacts generated in the region from output from commercial fishing activity elsewhere that land in the counties within the estuary. Fish and shrimp unloaded in a particular region will generate economic impacts in that region, through direct sales or processing, regardless of where they are caught. To reflect these impacts, an alternative estimate was used where value of landings by county were used as an indicator of direct economic impacts in this study. Alternatively, there are lost economic values due to fish and shrimp caught off the waters of the Laguna Madre but landed outside of the region and Texas. This study accounts for only economic impacts gained from commercial fishing by accounting for the total landings in the counties of the Laguna Madre region and Texas, regardless of where they were caught. Data from the NFMS was used for landings from all areas of the Gulf in the counties of the Laguna Madre region.

In estimating direct impacts, four distinct scenarios were considered.

- I. bay system only (inshore catch),
- II. bay and gulf catch (inshore+offshore) (base scenario)
- III. total value of gulf and bay catch that land in the counties in the estuary, regardless of where caught (Lower Laguna Madre)
- IV. total value of gulf and bay catch that land in the counties in the estuary, regardless of where caught (Total Laguna Madre).

Direct Impacts of Inshore and Offshore Commercial Fishing

Total value of output from commercial fishing in the region was used as an estimate of direct impacts for this industry. In addition, since landings from one year to the other may differ significantly, an average of landings in 1993, 1994, and 1995 were computed to represent a typical year (Table 4.4). Direct impacts for the commercial fishing industry were estimated by total ex-vessel value of finfish, shellfish, and shrimp landed in the Upper and Lower Laguna Madre bay systems (inshore) and the allocation for gulf fishing based on the percentage weight of the Laguna Madre bay systems of all bay system catch along the Texas Gulf coast. Data from Robinson, et al., 1996, were used in developing weights and estimating direct impacts. This procedure is consistent with that of the 1987 study and assumes that the Texas offshore shrimp catch is landed in the same pattern as the bay catch. As is shown by the comparison with the county landings data used in scenario III, this assumption may not be true (Table 4.5).

Total value of output from commercial fishing in the Laguna Madre region was estimated to be about \$2.43 million for 1995. This is total value of output for inshore and offshore commercial fishing in the region. Inshore fishing had a direct impact of \$1.21 million, and the direct impact from offshore fishing was estimated to be about \$1.22 million (Table 4.4). The inshore estimate (\$1.21 million) and the combined inshore and offshore (\$2.43 million) estimates are used as the direct impacts of commercial fishing within the Laguna Madre region for scenarios I and II.

Table 4.4. Ex-Vessel Value (Direct Impacts) of inshore and offshore landings for finfish, shrimp, and shellfish for the Laguna Madre Region (1993-1995 average) .

	Inshore	Offshore	Total
	(\$)	(\$)	(\$)
Fish and shellfish (except shrimp)	1,014,254	337,943	1,352,197
Shrimp	195,203	883,252	1,078,455
TOTAL	1,209,457	1,221,195	2,430,652

Source: Robinson et al., 1996

Direct Impacts of Laguna Madre Estuary Landings from Other Gulf Grid Zones and Bay Systems

As an alternative scenario, impacts of commercial fishing in the Laguna Madre region were estimated for total landings in the counties included in the estuary regardless of where the fish were caught. As mentioned earlier, estimated values of shrimp and fish by county landed in the Laguna Madre region may be of more immediate significance in terms of current, direct impact to the regional economy within the time frame of this study. This estimate includes the value of shrimp and fish landed within the region during the time period studied irrespective of the area in the Gulf or bay system in which they were caught. For shrimp, these data were readily available from the NMFS. However, fish and other shellfish landings are reported as Gulf total only, available from the TPWD.

To estimate fish landings by county, percent shares of total shrimp landings by counties in the estuary were estimated and applied to total bay and gulf fish and shellfish landings for the Gulf of Mexico. That is, it is assumed that fish and shellfish landing pattern by county are the same as that of shrimp.

Table 4.5 shows estimated fish and shrimp landed in the Lower Laguna Madre (Cameron County) and Total Laguna Madre (Cameron and Nueces Counties) regions from any bay system or gulf grid zone in the Gulf of Mexico. The value of landings under this scenario was much larger compared to the value for inshore and offshore fishing because fish and shellfish caught in all areas on the Gulf coast were included in this scenario. Total ex-vessel value of shrimp was about \$56 million with fish and other shellfish valued around \$7.10 million (1993-95 average) (NMFS, 1997 and Robinson, et al. 1996). Direct impacts for this scenario is \$63.10 million without Nueces county, and \$65.20 million including Nueces county (Table 4.5). These fish and shrimp caught in other areas are brought ashore in the Laguna Madre estuary region and are sold and processed there, creating economic impacts in the region.

Table 4.5. Ex-vessel values of finfish, shellfish, and shrimp landed in Laguna Madre Region (by county) from all bay systems and the Gulf (1993-1995 average).

Year	Lower Laguna Madre Fish and Shellfish	Total Laguna Madre Fish and Shellfish
	(\$ millions)	
1993	49,344,609	51,454,418
1994	68,026,492	70,740,518
1995	71,908,408	73,373,114
3-year average	63,093,170	65,189,350

Source: NMFS and Robinson, et al., 1996.

The four scenarios considered in the model have the following direct impacts:

- I. Upper and Lower Laguna Madre bay systems (inshore) catch: \$1.21 million
- II. Inshore + offshore catch: \$2.43 million
- III. Landings in Cameron county: \$63.10 million
- IV. Landings in Cameron and Nueces counties: \$65.20 million

4.4. Recreation and Tourism

Recreation and tourism related activities provide economic benefits to the economy of the region where these activities occur as well as throughout Texas. These economic impacts can be classified into direct and secondary impacts. Impacts on a regional or state economy are typically indicated by total output value, employment, or total income resulting from sales to final demand by a given sector of the economy. Estimation of economic impacts for recreational activities is not so straightforward since the direct impacts (expenditures) are not organized within an economic sector but may be distributed over several sectors of the economy. Recreational activities such as boating, fishing, birdwatching, and others do not have immediately measurable economic values such as sales or payrolls. However, contribution to local businesses is significant as participants in these activities generate local income by recreational spending. Direct impacts for recreational activities are represented by estimated total expenditures by leisure travelers. These direct impacts also have secondary impacts on regional and state economies. To estimate secondary impacts of these activities, direct expenditures are allocated to the sectors in which money is spent, according to the Standard Industrial Classification (SIC), to match up with the input-output model. Secondary impacts are estimated to be the direct recreational expenditures multiplied by the input-output multiplier.

Since no survey was conducted for the present analysis, expenditure and recreational activity data provided by the Texas Department of Commerce (TDOC) along were used to estimate direct impacts of recreational activities in the region. The TDOC data include a travel survey conducted by D.K.Shifflett and Associates Ltd. (D.K.S.&A Ltd.) along with total travel expenditures from 1987 to 1995 by county compiled by the TDOC. The D. K. S & A. Ltd. survey is by Metropolitan Statistical Area (MSA) or Designated Market Area (DMA). In this study the Brownsville-Harlingen-San Benito MSA and the Corpus Christi MSA data were used for travel expenditure breakdowns and share of business and leisure travel, as well as the estimation of water-related activity participation. These data were found to be the most adequate and complete source for the purposes of this study. Other existing data on recreational fishing from the TPWD were not used as these data did not provide specific information needed for the model used in this study.

Total travel expenditure, payroll, and employment for the Laguna Madre Region in 1995 are given in Table 4.6. These figures include business and leisure travel expenditures spent within the area for all kinds of business and leisure activities including bay and estuary related recreation. Total travel expenditures in the region were \$1.2 billion in 1995. Nueces, Hidalgo, and Cameron counties accounted for almost 95 percent of total travel expenditures in the region. Travel related employment was 21,230 for the Laguna Madre region area in 1995 (Table 4.6).

Table 4.6. Travel expenditures, payroll, and employment in the Laguna Madre region, 1995.

County	Travel Expenditures (\$millions)	Travel Payroll (\$millions)	Employment (jobs)
Cameron	375.52	107.65	6,780
Hidalgo	315.91	81.01	5,170
Kenedy	0.37	0.07	0
Kleberg	24.04	5.41	450
Willacy	8.87	1.44	110
Nueces	472.36	130.61	8,440
TOTAL	1,215.32	329.75	21,230

Source: TDOC, 1996

Methodology for the Estimation of Water-Related Recreation Expenditures

An estimate of total expenditures by leisure travelers participating in water-related activities was obtained as follows:

$$Y = x_b B + x_l L \quad (1)$$

where

Y = Total Travel Expenditures

x_b = Expenditures per person day for business travelers

x_l = expenditures per person day for leisure travelers

B = Total person days of business travel

L = Total person days of leisure travel

Let

$$B + L = T \quad (2)$$

$$B = b T \quad (3)$$

and

$$L = l T \quad (4)$$

where:

 T = Total Travel in Person Days b = percentage share of business travelers l = percentage share of leisure travelers

Substituting (3) and (4) in (1);

$$Y = x_b [b T] + x_l [l T] \quad (5)$$

solving for T ;

$$T = \frac{Y}{x_b b + x_l l} \quad (6)$$

Using data from Tables 4.6, 4.7, 4.8, expenditures for water-related travel were estimated for the region both with and without Nueces county.

Total expenditures (Y) for the region (Table 4.6) and share of business and leisure travel (x_b and x_l) were obtained from the TDOC for the Brownsville-Harlingen-San Benito MSA and Corpus Christi MSA (Tables 4.7 and 4.8). Visitors to the area spent \$78.90 per day in the Brownsville-Harlingen-San Benito MSA and about \$68.90 per day in the Corpus Christi MSA in 1995. Relative popularity of water related activities were also estimated from the MSA data and are all shown in Table 4.7. In 1995, thirty-eight percent of leisure trips were in water-related activities in the Brownsville-Harlingen San Benito MSA and about thirty percent in the Corpus Christi MSA. Using these data water-related recreational expenditures were estimated as \$185.65 million without Nueces County, and \$322.65 with Nueces county (\$136.99 million for Nueces County alone). A total of 3,422,594 person days of water-related recreational travel were estimated from this analysis (The sum of 2,353,012 person days in the Lower Laguna Madre and 1,069,583 person days in Nueces County) (Table 4.7).

Table 4.7. Estimation of Water Related Expenditures for the Laguna Madre Region, 1995.

	Cameron, Hidalgo, Kenedy, Kleberg, Willacy (Brownsville-Harlingen-San Benito MSA) Lower Laguna Madre				Nueces County (Corpus Christi MSA)			
	Business	Leisure	Water- Related	Travel Expenditures (1993-1995).	Business	Leisure	Water- Related	Travel Expenditures (1993-1995)
Percent of respondents (<i>b</i> and <i>l</i>)	28.70	71.30	(38% of Leisure)		35.40	64.60	(30% of Leisure)	
Expenditures per person/day (<i>x_b</i> and <i>x_l</i>)	97.10	78.90			108.00	68.90		
Total Expenditures (Y) (\$mils)	242.02	488.56	185.65	730.58	211.33	245.32	137.00	456.65
Number of Person days (B and L)	2,492,487	6,192,136	2,353,012		1,953,727	3,565,276	1,069,583	

Source: Estimated from TDOC and D.K.S.&A. Ltd. , 1997.

Estimation of Direct Impacts of Water-Related Recreational Activities

Direct impacts of water-related recreational activities on individual economic sectors in the study area were estimated using average daily expenditure shares from D.K.S.&A Ltd (Table 4.7). The assumption is made here that the distribution of water-related expenditures to the various sectors is the same as that for all leisure travel. Expenditures by sector were then allocated to the corresponding sector in the input-output model for the purpose of estimating secondary impacts (Table 4.8).

Table 4.8 Distribution of leisure expenditures per person per day, Brownsville-Harlingen-San Benito and Corpus Christi MSA's, 1995

Expenditure Category	\$/person/day Brownsville- Harlingen-San Benito MSA	percent of total	\$/person/day Corpus Christi MSA	percent of total
	(\$)		(\$)	
Transport	23.2	0.29	18.1	0.26
Lodging	9.3	0.12	11.4	0.17
Food	17.1	0.22	15.0	0.22
Entertainment	7.7	0.10	7.3	0.11
Other	3.2	0.04	2.0	0.03
Shopping	18.4	0.23	15.1	0.22
TOTAL	78.9	1.00	68.9	1.00

Source: D.K.S.&A Ltd., 1996

Visitors to the area for all leisure purposes spent approximately \$78.9 per person per day in the Brownsville-Harlingen-San Benito MSA and \$68.9 per person per day in the Corpus Christi MSA in 1995 (Table 4.8). Out of this total, the majority of daily expenditures were for transportation and food. Using shares of each expenditure category, total regional expenditures were allocated to the major expenditure categories. Expenditures in these categories were then allocated to appropriate sectors that are represented by SIC's to be used in the input-output model to estimate secondary impacts. The allocation of estimated 1995 direct recreational expenditures to Laguna Madre regional economic sectors is shown in Table 4.9. Expenditures for shopping and the category "other", which was also included in overall retail, were reduced by thirty percent to account for the marketing margin as wholesale prices need to be considered in this analysis to be consistent with final demands for other sectors that do not sell directly to retail consumers. Total expenditures of \$297.20 million were estimated for the Total Laguna Madre region in 1995.

It is estimated that leisure travelers participating in water-related activities spent \$90.58 million in the region for transportation, and about \$70.06 million for food related purchases (food restaurants and stores). The other businesses impacted by direct

expenditures include hotels and motels, amusement services, and miscellaneous retail (Table 4.9).

Table 4.9. Direct Impacts of Water Recreation Related Sectors in the Laguna Madre Region.

Expenditure category	Lower Laguna Madre	Nueces County	Total Laguna Madre	Corresponding Regional Economic Sector
		(\$ millions)		
Transport	54.59	35.99	90.58	Gas Service Stations
Lodging	21.88	22.67	44.55	Hotels and Motels
Food	40.24	29.82	70.06	Restaurants and Food Stores
Entertainment	18.12	14.51	32.63	Amusement, Theaters, etc
Other	5.27	2.79	8.06	Miscellaneous Retail
Shopping	30.31	21.01	51.32	Miscellaneous Retail
TOTAL	170.41	126.79	297.20	

Source: Estimated from D.K.S.&A Ltd. and TDOC.

4.5. Agriculture

Total value of agricultural production was compiled from the Texas Agricultural Extension Service (TAEX, 1993-1995). Three year averages (1993-1995) for all counties were used to obtain final demand for agricultural activities with and without Nueces county. Table 4.10 shows the direct impacts for agricultural sectors in the Laguna Madre area. For purposes of this study, it was assumed that all agricultural products were either exported from the region or sold directly to the consumers.

Table 4.10. Direct Impacts of Agriculture, 1993-1995.

Sectors	w/out Nueces County	with Nueces County
	(\$ millions)	
Dairy and Farm Products	1.13	1.17
Beef	40.87	43.54
Other Meat Animals and Livestock Products	0.99	1.40
Cotton	76.47	113.15
Food Grains	0.00	0.01
Feed Crops	77.81	102.81
Fruits and Nuts	19.95	19.95
Vegetables	112.61	112.65
Sugar and Miscellaneous Products	91.83	92.34
Oil Bearing Crops	0.61	0.61
TOTAL	422.27	487.61

Source: TAEX, 1993-1995.

4.6. Summary of Direct Impacts

Direct impacts estimated above are summarized in Table 4.11 by categories defined above. Total direct impacts for all GIWW related sectors were estimated as \$1.73 billion without Nueces County and \$2.83 billion with Nueces County. Largest direct impacts were in Category I (oil extraction, petroleum refining, chemicals, transportation services, ship and boat building) representing about fifty three to fifty nine percent of total final demand of sectors related to the GIWW in the region from Corpus Christi to Brownsville. All other categories had similar shares except for the commercial fishing industry.

Table 4.11. Estimated Final Demands by Category in the Laguna Madre Region, 1995.

Cate gory	Sector	Lower Laguna Madre (\$ millions)	% share	Total Laguna Madre (\$ millions)	% share
I.	Oil Extraction, Petrochemicals and Transportation Services	912.54	0.53	1,678.24	0.59
II.	Heavy Construction and some agricultural commodities (sugar)	225.57	0.13	336.28	0.12
III.	Commercial Fishing (inshore+offshore)and Seafood Manufacturing	72.35	0.04	99.25	0.04
IV	Water related recreation	170.41	0.11	297.20	0.11
V.	Agriculture	330.44	0.19	395.28	0.14
TOTAL		1,726.55	1.00	2,831.70	1.00

5. Total Economic Impacts on the Laguna Madre Economy

The estimated direct impacts or sales to final demand shown in Table 4.11 provided the basis for estimating the total economic impacts of bay related sectors in the Laguna Madre region. Sales to final demand by these export industries constitute the initial impacts that stimulate the demand for goods and services from other sectors of the economy through secondary and tertiary rounds of market exchanges. This "ripple" effect in the regional economy leads to a total impact that is larger than the original sales transactions. The input output model used in this study provides a methodology by which these successive rounds of impacts are aggregated into a total for the regional and state economies.

The study area for is unique in that virtually all the economic activity of the area is located at either at the northern or southern extremes. However, there is significant economic interaction throughout the area. Hence, two IMPLAN models were developed for the GIWW area, with and without Nueces county (Lower and Total Laguna Madre regions). The two models were used to be able to account for the impacts of GIWW related sectors throughout the region and also to estimate impacts for the southern part of the region alone.

5.1. Impacts on the Laguna Madre Regional Economy

The estimated impacts of bay related economic activities in the Laguna Madre area are shown in Table 5.1. Estimates of total impacts are given for total regional output, personal income, value added and employment for each of the thirteen bay related economic sectors. These are calculated using the economic impact multipliers for the Laguna Madre region shown in Appendix I. Detailed impacts for the Laguna Madre region and Texas are presented in Appendix II. It is estimated that, in total, the GIWW related sectors' sales to final demand stimulated total regional business sales of over \$4.85 billion, personal income of \$1.26 billion, value added of \$2.30 billion and 57,533 ~~thousand~~ jobs in the Total Laguna Madre region. For the Lower Laguna Madre, the impacts were \$2.71 billion in output, \$756.13 million in personal income, \$1.32 billion in value-added and 39,483 jobs in 1995 (Table 5.1).

These estimates indicate that the GIWW related industries are a significant part of the area's economic base. An estimate of the relative importance of the bay related industries can be made using employment. The GIWW related employment estimate (57,533) was about one-fifth of the reported total employment in six county study Laguna Madre region in 1995 (Table 2.1 and 5.1).

Table 5.1 Estimated Impacts of Sectors Associated with the GIWW on the Laguna Madre Economy (Total and Lower Laguna Madre Regions), 1995.

Category	Sector	Economic Impact Variable							
		<u>Output</u>		<u>Personal Income</u>		<u>Value Added</u>		<u>Employment</u>	
		Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
		(\$ millions)				(Jobs/\$ million)			
1	Oil and Gas Extraction	9.60	44.85	2.05	10.20	6.76	30.39	71	320
1	Mining and Quarrying	1.44	2.20	0.45	0.70	0.95	1.47	17	25
1	Chemical and Allied Products	277.33	902.08	73.04	192.84	148.49	410.66	2,269	5,303
1	Petroleum Refining and Related Industries	653.29	1145.10	92.25	143.47	204.25	368.27	2,908	3,959
1	Ship and Boat Building and Repairing	14.87	24.37	4.42	7.26	6.56	11.00	211	320
1	Transportation and Transportation Service	405.70	708.47	107.39	184.30	178.81	311.56	4,938	7,993
3	Commercial Fishing (inshore+offshore)	3.30	3.60	0.99	1.05	2.36	2.48	77	77
3	Seafood and Miscellaneous Food Preps.	113.59	164.01	20.34	29.91	38.93	56.97	1,166	1,705
4	Tourism and Related Industries	289.79	534.3	112.69	204.56	178.56	323.96	6,605	11,615
5	Agriculture	728.34	895.64	247.66	296.13	416.34	511.56	16,856	18,827
2	Heavy Construction	215.42	421.41	94.85	188.03	136.51	275.80	4,365	7,389
TOTAL		2,712.67	4,846.03	756.13	1,258.45	1,318.52	2,304.12	39,483	57,533

Tourism and related industries (water-related tourism only) generated the second highest employment impact in the region, and twenty-two percent of all employment generated. In the Total Laguna Madre region, highest output impacts were generated by the petroleum refining industries accounting for \$1.15 billion in output impacts (Table 5.1).

In comparing the relative contribution of bay related sectors, employment, personal income and value added are the best economic variables to use. Output or total regional business sales is a less desirable variable because it includes double counting of sales as products as they move through the production, processing and marketing system.

In what follows, impacts associated with the different sectors will be discussed in detail.

5.2. Major Industrial Sectors

Economic impacts of industry were quite different with and without Nueces county included in the region. Especially for petroleum refining and chemical industries, impacts with Nueces county included were much higher.

The petrochemical industries were clearly a major component of the economic base of the Laguna Madre region, particularly in the Total Laguna Madre region, where Chemicals and Allied Products generated an estimated 5,303 jobs and \$192.84 million in personal income. Petroleum refining industries supported, either directly or indirectly, an estimated 3,959 jobs and were also significant in the total amount of regional income and value added. In the Lower Laguna Madre region, output impacts for petroleum refining industries were \$653.29 million compared to \$1.15 billion in the Total Laguna Madre (Table 5.1).

The heavy construction sector was responsible for 7,389 jobs, \$188.03 million in personal income and \$275.80 million in value added in the Total Laguna Madre regional economy in 1995. The construction of new mineral extraction facilities, primarily offshore drilling platforms and rigs, was the dominant activity in this sector. Since the operation of these offshore rigs may be by non-local companies, this is an export activity like any other export industry (Table 5.1).

Agriculture was estimated to be a major employment generator in the region as it accounted for some 18,827 jobs either directly or indirectly, primarily in related agribusiness firms that supply production inputs, provide services and process agricultural commodities. Agriculture was also important as a major income generating sector in the region with a personal income impact of \$296.13 million in the Total Laguna Madre region (Table 5.1). The difference in impacts for the Total and Lower Laguna Madre regions is not that different for agriculture as Nueces county reflects a small portion of economic activity in agriculture, unlike the petrochemicals sector.

In general, the wide variety of economic enterprises and activities that comprise the GIWW related sectors of the Laguna Madre regional economy are responsible for

significant impacts as they export goods and services to parties outside the region and generate new regional money flows.

5.3. Tourism and Related Industries

Economic impacts of water-related tourism and related industries are shown in Table 5.2. Impacts are shown for the study region defined with and without Nueces County as well as for the Laguna Madre regional economy and the state. Water-related tourist expenditures in the region generated \$534.30 million in total output, \$204.56 million in personal income, \$323.96 million in value-added, and 11,615 thousand jobs for the Total Laguna Madre region. In the Lower Laguna Madre, impacts were about one-third lower with an output impact of \$289.79 million, value-added impact of \$178.56 million and about 6,605 generated jobs in the region. Statewide impacts were slightly higher, with output impacts of \$580.39 million and \$331.75 million for the total and Lower Laguna Madre regions respectively (Table 5.2).

In constructing the model to estimate total impacts, it was not possible to develop a multiplier for tourism and recreation because expenditures from these activities are spread among several sectors, and there is no sector as "tourism". However, after the analysis, "psuedo-multipliers" may be constructed. The total impacts presented in Table 5.2 are based on an estimated \$297.20 million annual expenditure by tourists and recreationists in the regional economy (Total Laguna Madre) (Table 4.9). Therefore, it may be stated that, on average, each dollar of tourist and recreationist expenditures resulted in about \$1.80 in total output, \$0.69 of personal income, \$1.10 of value added in the Laguna Madre economy. In addition, an employment multiplier of about 39 jobs per million dollars of tourist and recreationist expenditures is indicated by the analysis.

Table 5.2. Total Impacts of the Tourism and Related Industries on the Laguna Madre Regional Economy, 1995.

Economic Impact Variable	Total Impacts			
	Regional		State	
	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
Direct Impact (\$ mil)	170.41	297.20	170.41	297.20
Output (\$ mil)	289.79	534.30	331.75	580.39
Personal Income(\$ mil)	112.69	204.56	134.12	223.85
Value-Added (\$ mil)	178.56	323.96	206.21	358.63
Employment (jobs)	6,605	11,615	6,605	11,615

¹In the estimation of total statewide impacts, multipliers for some sectors were smaller than the study area regional multipliers. Conceptually, this should not occur. This problem was encountered only in a few sectors where most activities are local and service oriented, and only for employment multipliers. This phenomenon might, therefore, be attributed to the fact employment impacts of these industries are largely confined to the regional economy. Whenever a smaller multiplier was encountered at the state level, multipliers for the region and state level were assumed to be the same.

Tourism related sectors ranked second in employment in the region, both for the Lower and Total Laguna Madre regions. It is interesting to note that the tourism sector ranked lower than second in terms of total personal income and value added. This is as expected because this sector of the economy is dominated by retail stores and personal services which have lower than average wage rates and returns to other resources than that of the capital intensive sectors of the region. For example, employment impacts of Tourism and Related Industries were more than twice those of the Chemical and Allied Products sector, on the other hand, the value-added impacts estimated for Chemical and Allied Products exceeded that of Tourism and Related Industries (Table 5.1).

5.4. Commercial Fishing

Four scenarios were implemented to analyze the impacts of commercial fishing on the Laguna Madre economy. Regional impacts of commercial fishing for Scenario II (inshore+offshore fishing) only are reported in Table 5.1 as this was chosen as the base scenario. Impacts of commercial fishing under scenario II (inshore+offshore) totaled \$3.60 million in output and \$2.48 million in value-added for the Total Laguna Madre

region. Commercial fishing activity by both inshore and offshore fishing generated 77 jobs and a personal income of \$1.10 million in the Total Laguna Madre region (Table 5.3). Since there was no way of accounting for the share of landings in Nueces County, for scenarios I and II, the difference between the Lower and Total Laguna Madre region impacts arise from the difference in multipliers, so impacts for the two regions are similar. Impacts of landings from all other areas of the Gulf to Nueces and Cameron counties (Scenarios III and V) reflect the impact of Nueces county, although landings in Nueces county represent only a small portion of total landings from all areas. Impacts of all four scenarios are presented in Table 5.3. for the Laguna Madre region.

At the state level, impacts were estimated to be about \$2.56 million in output and \$1.75 million in value-added with an employment impact of 56 jobs for inshore fishing. For inshore+offshore fishing, statewide impacts were \$3.84 million for output, and \$2.63 million for value-added. In terms of employment, 85 jobs were generated statewide (Table 5.3).

Scenarios III and IV reflect the actual landings in the region from all other areas in the Gulf of Mexico for the Lower Laguna Madre and Total Laguna Madre respectively. Regional output impacts were estimated as \$94.77 million for the Lower Laguna Madre and \$97.92 million for the Total Laguna Madre. Employment impacts were 2,019 and 2,086 jobs in the Lower and Total Laguna Madre regions. Impacts under scenarios III and IV are not significantly different since Cameron County (Lower Laguna Madre) accounts for the bulk of the value of total landings in the region. At the state level, estimates of total impacts of commercial fishing under scenario IV were \$104.24 million in output, \$71.46 million in value-added and about \$32.10 million in personal income for the Total Laguna Madre (Scenario IV) (Table 5.3).

Table 5.3. Estimated Total impacts of Commercial Fishing for the Four Scenarios in the Total Laguna Madre regions and Texas, 1995.

	<u>Scenarios*</u>				<u>Scenarios*</u>			
	I	II	III	IV	I	II	III	IV
	Regional Impacts				Statewide Impacts			
Direct Impacts (\$mils)	1.2	2.4	63.10	65.20	1.20	2.40	63.10	65.20
Output (\$ mils)	2.40	3.60	94.77	97.92	2.56	3.84	100.88	104.24
Personal Income (\$ mils)	0.70	1.05	27.35	28.47	0.79	1.18	31.06	32.10
Value-added (\$ mils)	1.65	2.48	65.17	67.34	1.75	2.63	69.16	71.46
Employment (jobs)	51	77	2,019	2,086	51	85	2,231	2,306

*

I. bay system only (inshore catch),

II. bay and gulf catch (inshore+offshore) (base scenario)

III. total value of gulf and bay catch that land in the counties in the estuary, regardless of where caught (without Nueces county)

IV. total value of gulf and bay catch that land in the counties in the estuary, regardless of where caught (with Nueces county).

5.5. Statewide Impacts of the GIWW Related Sectors

The economic impacts of the bay related economic sectors in the Laguna Madre region on the Texas economy as a whole are presented in Table 6.1. The interpretation of the impact variables are the same as that presented for the Laguna Madre regional impacts shown in Table 5.1 but in general the impacts are larger since they are distributed to businesses and individuals throughout the state and including the Laguna Madre region.

In the estimation of total state wide impacts, multipliers for some sectors were smaller than the Laguna Madre regional multipliers. Conceptually, this should not be the case. This problem was encountered only in a few of the sectors where most activities are local and service oriented and mostly for employment multipliers. This phenomenon might therefore be attributed to the fact that employment impacts of these industries are largely confined to the regional economy. Whenever a smaller multiplier was encountered at the state level, the multipliers for the region and the state level were assumed to be the same, and the regional multiplier was used. This is why, for example, the tourism sector employment impacts are the same for the Laguna Madre region and the state.

The statewide impacts are estimates as the total direct, indirect and induced effects of bay related enterprises and activities on all sectors of the Texas economy. In aggregate, the GIWW related sectors of the Laguna Madre economy had the following impacts on the Texas economy: \$5.10 billion in total business sales (output), \$1.43 billion in personal income, \$2.60 billion in value-added and 58,783 jobs (Table 6.1). These estimates are for the Total Laguna Madre region. For the most part, there was little change in the relative magnitude among sectors as the estimation moved from the regional to the state level.

Table 5.4 Estimated Impacts of Sectors Associated with the GIWW on Texas (Total and Lower Laguna Madre Regions), 1995.

Category	Sector	Economic Impact Variable							
		<u>Output</u>		<u>Personal Income</u>		<u>Value Added</u>		<u>Employment</u>	
		Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre	Lower Laguna Madre	Total Laguna Madre
		(\$ millions)						Jobs ²	
1	Oil and Gas Extraction	9.91	44.74	2.08	10.00	6.90	30.30	71	320
1	Mining and Quarrying	1.72	2.50	0.56	0.82	1.04	1.51	17	25
1	Chemical and Allied Products	385.57	983.22	96.19	245.30	185.52	473.10	2,352	5,999
1	Petroleum Refining and Related Industries	758.27	1,238.69	109.16	178.31	266.69	435.65	2,908	4,505
1	Ship and Boat Building and Repairing	17.86	27.03	6.95	10.53	9.79	14.80	211	320
1	Transportation and Transportation Service	466.68	752.62	136.17	217.79	222.26	357.47	4,938	7,993
3	Commercial Fishing (inshore+offshore)	3.84	3.84	1.18	1.18	2.63	2.63	85	85
3	Seafood and Miscellaneous Food Preps.	122.14	169.10	26.57	36.78	54.10	74.76	1,166	1,705
4	Tourism and Related Industries	331.75	580.39	134.12	223.85	206.21	358.63	6,605	11,615
5	Agriculture	733.45	854.20	259.29	300.62	477.93	550.49	16,856	18,827
2	Heavy Construction	145.07	446.49	106.96	201.79	158.91	297.39	4,365	7,389
	TOTAL	2,976.26	5,102.82	879.23	1,426.97	1,591.98	2,596.73	39,574	58,783

²In the estimation of total statewide impacts, multipliers for some sectors were smaller than the study area regional multipliers. Conceptually, this should not occur. This problem was encountered only in a few sectors where most activities are local and service oriented, and only for employment multipliers. This phenomenon might, therefore, be attributed to the fact employment impacts of these industries are largely confined to the regional economy. Whenever a smaller multiplier was encountered at the state level, multipliers for the region and state level were assumed to be the same.

6. Conclusions

The purpose of this study was to estimate economic impacts of industries and other economic activities that are related to the portion of the GIWW from Corpus Christi to Brownsville. As a first step, economic activities were categorized to reflect the different ways these benefit from, or are affected by the GIWW, to guide in the selection of economic activities to be used in the study. Then, direct impact or sales to final demand associated with these industries/activities were estimated.

The study region was defined as Lower Laguna Madre (without Nueces County) and Total Laguna Madre (including Nueces County) regions to account for the heavy concentration of economic activity in Nueces County, especially for the petrochemical industries. Two input-output models were constructed and, using IMPLAN, multipliers were estimated for the given sectors.

Estimated total regional output impacts of GIWW related sectors were \$2.71 billion and \$4.85 billion for the Lower and Total Laguna Madre regions respectively. Largest impacts were generated by petroleum refining, agriculture, chemical industries and tourism related industries. Agriculture generated the highest employment impact with tourism related industries ranking second in total employment impacts in both regions. In the Total Laguna Madre region, out of a total 57,533 jobs generated by all GIWW related sectors, agriculture accounted for 18,827 jobs and tourism related sectors accounted for 11,615 jobs. Output impacts in the Total Laguna Madre region were dominated by the petroleum refining and chemical industries. In the Lower Laguna Madre region however, these sectors had lower impacts.

The results of the study show relative impacts of sectors related to the GIWW to provide input on decisions affecting the maintenance and operation of the GIWW. The analysis provides information on how the activities in the region that use the GIWW or are affected by the GIWW impact the regional economy in terms of total output, personal income, value-added and employment in the region and around the state. The analysis also provides a synopsis of the regional economy in terms of its make-up and contribution. Another important result of the study is the estimation of "pseudo-multipliers" for tourism. The analysis showed that each dollar in water-related tourism expenditures resulted in \$1.80 in output, \$0.69 in personal income, \$1.10 in value-added, and 39 jobs per \$ million in the Total Laguna Madre economy. Detailed conclusions and implications from this study are presented in the Executive Summary.

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APPENDIX I. Multipliers for the Lower and Total Laguna Madre Region and Texas

Table I.1 Output Multipliers for Total Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	1.0000	0.1386	0.4205	1.5590
2	Beef	1.0000	0.1280	0.4464	1.5743
3	Other meat animals and livestock products	1.0000	0.1875	0.2002	1.3877
4	Cotton	1.0000	0.5038	0.5145	2.0183
5	Food grains	1.0000	0.4467	0.2962	1.7429
6	Feed crops	1.0000	0.3455	0.3444	1.6900
7	Fruits and tree nuts	1.0000	0.7167	0.4184	2.1351
8	Vegetables	1.0000	0.3562	0.4186	1.7748
9	Sugar and misc. crops	1.0000	0.4652	0.4573	1.9225
10	Oil bearing crops	1.0000	0.5896	0.3422	1.9317
11	Commercial fishing	1.0000	0.1897	0.3122	1.5019
12	Natural gas&crude petroleum	1.0000	0.3642	0.3205	1.6847
13	Natural gas liquids	1.0000	0.0741	0.0646	1.1387
14	Stone, sand, gravel and chemical mining	1.0000	0.2087	0.3556	1.5643
15	New highways and streets	1.0000	0.3514	0.3831	1.7345
16	New mineral extraction facilities	1.0000	0.0345	0.6874	1.7218
17	Seafood	1.0000	0.4146	0.2225	1.6371
18	Misc. food preparations except seafood	1.0000	0.4227	0.2122	1.6348
19	Chemical products	1.0000	0.5850	0.2861	1.8711
20	Petroleum refining, paving, etc	1.0000	0.3166	0.1296	1.4462
21	Ship and boat building and repairing	1.0000	0.2598	0.3411	1.6009
22	Railroads and related services	1.0000	0.5097	0.4460	1.9557
23	Motor freight transport and warehousing	1.0000	0.8052	0.4278	2.2330
24	Water transportation	1.0000	0.6788	0.2685	1.9472
25	Air transportation	1.0000	0.4873	0.3452	1.8325
26	Pipelines, except natural gas	1.0000	0.3578	0.1780	1.5358
27	Transportation services	1.0000	0.4393	0.5285	1.9678
28	Food stores, eating and drinking	1.0000	0.3191	0.4732	1.7924
29	Automotive dealers and service stations	1.0000	0.2583	0.5246	1.7829
30	Miscellaneous retail	1.0000	0.2017	0.5360	1.7378
31	Hotels and lodging places	1.0000	0.3604	0.4672	1.8276
32	Amusement and recreation services	1.0000	0.4784	0.4162	1.8946

Table I.2 Personal Income Multipliers for Total Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.4065	0.0440	0.1375	0.5880
2	Beef	0.4396	0.0386	0.1460	0.6242
3	Other meat animals and livestock products	0.1641	0.0504	0.0655	0.2800
4	Cotton	0.3548	0.1964	0.1683	0.7195
5	Food grains	0.2115	0.1059	0.0969	0.4142
6	Feed crops	0.2841	0.0849	0.1126	0.4816
7	Fruits and tree nuts	0.1878	0.2605	0.1368	0.5851
8	Vegetables	0.3211	0.1273	0.1369	0.5854
9	Sugar and misc. crops	0.3399	0.1500	0.1496	0.6395
10	Oil bearing crops	0.2149	0.1517	0.1119	0.4785
11	Commercial fishing	0.2905	0.0440	0.1021	0.4366
12	Natural gas&crude petroleum	0.1881	0.1553	0.1048	0.4482
13	Natural gas liquids	0.0419	0.0273	0.0211	0.0903
14	Stone, sand, gravel and chemical mining	0.3226	0.0583	0.1163	0.4972
15	New highways and streets	0.3003	0.1101	0.1253	0.5357
16	New mineral extraction facilities	0.7271	0.0092	0.2248	0.9612
17	Seafood	0.1147	0.1237	0.0728	0.3112
18	Misc. food preparations except seafood	0.1168	0.1105	0.0694	0.2967
19	Chemical products	0.1694	0.1371	0.0936	0.4000
20	Petroleum refining, paving, etc	0.0666	0.0722	0.0424	0.1812
21	Ship and boat building and repairing	0.2942	0.0712	0.1116	0.4770
22	Railroads and related services	0.3164	0.1614	0.1459	0.6237
23	Motor freight transport and warehousing	0.2233	0.2350	0.1399	0.5982
24	Water transportation	0.0965	0.1911	0.0878	0.3754
25	Air transportation	0.2179	0.1519	0.1129	0.4827
26	Pipelines, except natural gas	0.0858	0.1049	0.0582	0.2489
27	Transportation services	0.4241	0.1421	0.1729	0.7391
28	Food stores, eating and drinking	0.4161	0.0909	0.1548	0.6618
29	Automotive dealers and service stations	0.4781	0.0839	0.1716	0.7335
30	Miscellaneous retail	0.5094	0.0648	0.1753	0.7496
31	Hotels and lodging places	0.3743	0.1263	0.1528	0.6534
32	Amusement and recreation services	0.3026	0.1433	0.1361	0.5819

Table I.3 Value Added Multipliers for Total Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.4727	0.0722	0.2419	0.7867
2	Beef	0.5634	0.0669	0.2568	0.8870
3	Other meat animals and livestock products	0.2720	0.0909	0.1152	0.4781
4	Cotton	0.5836	0.2655	0.2960	1.1451
5	Food grains	0.4612	0.2221	0.1704	0.8537
6	Feed crops	0.5496	0.1717	0.1981	0.9195
7	Fruits and tree nuts	0.3639	0.3679	0.2407	0.9725
8	Vegetables	0.6895	0.1857	0.2408	1.1160
9	Sugar and misc. crops	0.5915	0.2461	0.2630	1.1006
10	Oil bearing crops	0.3340	0.3012	0.1968	0.8321
11	Commercial fishing	0.7738	0.0794	0.1796	1.0328
12	Natural gas&crude petroleum	0.6143	0.2512	0.1844	1.0498
13	Natural gas liquids	0.9200	0.0540	0.0371	1.0111
14	Stone, sand, gravel and chemical mining	0.7370	0.1031	0.2045	1.0447
15	New highways and streets	0.4674	0.1707	0.2203	0.8585
16	New mineral extraction facilities	0.9377	0.0178	0.3954	1.3509
17	Seafood	0.1591	0.2219	0.1280	0.5090
18	Misc. food preparations except seafood	0.2669	0.1858	0.1220	0.5747
19	Chemical products	0.4226	0.2646	0.1646	0.8518
20	Petroleum refining, paving, etc	0.2064	0.1842	0.0745	0.4651
21	Ship and boat building and repairing	0.4031	0.1230	0.1962	0.7223
22	Railroads and related services	0.4882	0.2485	0.2566	0.9932
23	Motor freight transport and warehousing	0.3568	0.3830	0.2461	0.9859
24	Water transportation	0.1555	0.2962	0.1544	0.6062
25	Air transportation	0.4091	0.2362	0.1985	0.8438
26	Pipelines, except natural gas	0.6240	0.1876	0.1024	0.9140
27	Transportation services	0.4897	0.2237	0.3040	1.0175
28	Food stores, eating and drinking	0.5794	0.1613	0.2722	1.0129
29	Automotive dealers and service stations	0.7331	0.1472	0.3017	1.1820
30	Miscellaneous retail	0.7901	0.1144	0.3083	1.2128
31	Hotels and lodging places	0.5955	0.1929	0.2688	1.0572
32	Amusement and recreation services	0.4068	0.2387	0.2394	0.8848

Table I.4 Employment Multipliers for Total Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	13	4	7	23
2	Beef	17	3	7	27
3	Other meat animals and livestock products	50	4	3	57
4	Cotton	12	20	8	40
5	Food grains	37	6	5	48
6	Feed crops	28	5	5	39
7	Fruits and tree nuts	26	24	6	57
8	Vegetables	18	12	6	36
9	Sugar and misc. crops	24	10	7	41
10	Oil bearing crops	33	11	5	49
11	Commercial fishing	26	2	5	32
12	Natural gas&crude petroleum	4	6	5	14
13	Natural gas liquids	1	1	1	3
14	Stone, sand, gravel and chemical mining	11	2	6	18
15	New highways and streets	12	4	6	22
16	New mineral extraction facilities	26	0	11	37
17	Seafood	7	6	3	17
18	Misc. food preparations except seafood	8	5	3	17
19	Chemical products	2	4	4	11
20	Petroleum refining, paving, etc	1	2	2	5
21	Ship and boat building and repairing	13	3	5	21
22	Railroads and related services	7	6	7	20
23	Motor freight transport and warehousing	13	12	7	32
24	Water transportation	6	7	4	17
25	Air transportation	7	6	5	18
26	Pipelines, except natural gas	2	4	3	9
27	Transportation services	11	5	8	25
28	Food stores, eating and drinking	31	4	7	42
29	Automotive dealers and service stations	19	3	8	30
30	Miscellaneous retail	44	3	8	55
31	Hotels and lodging places	23	6	7	36
32	Amusement and recreation services	21	7	6	34

Table I.5 Output Multipliers for Lower Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	1.0000	0.1272	0.3850	1.5122
2	Beef	1.0000	0.1340	0.4095	1.5435
3	Other meat animals and livestock products	1.0000	0.1959	0.1731	1.3690
4	Cotton	1.0000	0.4568	0.4628	1.9195
5	Food grains	1.0000	0.3799	0.2606	1.6405
6	Feed crops	1.0000	0.2651	0.3100	1.5752
7	Fruits and tree nuts	1.0000	0.5597	0.3533	1.9131
8	Vegetables	1.0000	0.2996	0.3683	1.6678
9	Sugar and misc. crops	1.0000	0.4054	0.4003	1.8057
10	Oil bearing crops	1.0000	0.4459	0.2832	1.7291
11	Commercial fishing	1.0000	0.1027	0.2707	1.3734
12	Natural gas&crude petroleum	1.0000	0.3315	0.2836	1.6151
13	Natural gas liquids	1.0000	0.0690	0.0575	1.1265
14	Stone, sand, gravel and chemical mining	1.0000	0.1812	0.3031	1.4843
15	New highways and streets	1.0000	0.2547	0.3089	1.5635
16	New mineral extraction facilities	1.0000	0.0293	0.6324	1.6616
17	Seafood	1.0000	0.3975	0.1946	1.5921
18	Misc. food preparations except seafood	1.0000	0.3825	0.1829	1.5653
19	Chemical products	1.0000	0.2137	0.2532	1.4669
20	Petroleum refining, paving, etc	1.0000	0.2231	0.1247	1.3478
21	Ship and boat building and repairing	1.0000	0.1904	0.2877	1.4781
22	Railroads and related services	1.0000	0.4008	0.3736	1.7744
23	Motor freight transport and warehousing	1.0000	0.7385	0.3682	2.1067
24	Water transportation	1.0000	0.5595	0.2079	1.7675
25	Air transportation	1.0000	0.3691	0.2967	1.6658
26	Pipelines, except natural gas	1.0000	0.2837	0.1410	1.4247
27	Transportation services	1.0000	0.4019	0.4657	1.8676
28	Food stores, eating and drinking	1.0000	0.2772	0.4160	1.6932
29	Automotive dealers and service stations	1.0000	0.2250	0.4604	1.6854
30	Miscellaneous retail	1.0000	0.1751	0.4754	1.6506
31	Hotels and lodging places	1.0000	0.2930	0.4007	1.6938
32	Amusement and recreation services	1.0000	0.4824	0.3564	1.8388

Table I.6 Personal Income Multipliers for Lower Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.4163	0.0417	0.1296	0.5875
2	Beef	0.4437	0.0434	0.1378	0.6249
3	Other meat animals and livestock products	0.1542	0.0516	0.0582	0.2641
4	Cotton	0.3502	0.2002	0.1557	0.7062
5	Food grains	0.2129	0.0971	0.0877	0.3976
6	Feed crops	0.2976	0.0711	0.1043	0.4731
7	Fruits and tree nuts	0.1878	0.2325	0.1189	0.5391
8	Vegetables	0.3211	0.1169	0.1239	0.5619
9	Sugar and misc. crops	0.3372	0.1389	0.1347	0.6108
10	Oil bearing crops	0.2149	0.1220	0.0953	0.4322
11	Commercial fishing	0.2903	0.0316	0.0911	0.4131
12	Natural gas&crude petroleum	0.1901	0.1472	0.0954	0.4328
13	Natural gas liquids	0.0424	0.0260	0.0193	0.0877
14	Stone, sand, gravel and chemical mining	0.3095	0.0510	0.1020	0.4626
15	New highways and streets	0.2814	0.0859	0.1039	0.4713
16	New mineral extraction facilities	0.7444	0.0078	0.2128	0.9650
17	Seafood	0.1147	0.1168	0.0655	0.2970
18	Misc. food preparations except seafood	0.1183	0.0992	0.0615	0.2790
19	Chemical products	0.2390	0.0621	0.0852	0.3864
20	Petroleum refining, paving, etc	0.0981	0.0502	0.0420	0.1903
21	Ship and boat building and repairing	0.2878	0.0544	0.0968	0.4391
22	Railroads and related services	0.3142	0.1302	0.1257	0.5701
23	Motor freight transport and warehousing	0.2172	0.2208	0.1239	0.5619
24	Water transportation	0.0917	0.1557	0.0700	0.3173
25	Air transportation	0.2215	0.1314	0.0998	0.4528
26	Pipelines, except natural gas	0.0852	0.0825	0.0475	0.2152
27	Transportation services	0.4233	0.1307	0.1567	0.7107
28	Food stores, eating and drinking	0.4174	0.0774	0.1400	0.6348
29	Automotive dealers and service stations	0.4742	0.0735	0.1549	0.7026
30	Miscellaneous retail	0.5089	0.0566	0.1600	0.7255
31	Hotels and lodging places	0.3726	0.1040	0.1349	0.6115
32	Amusement and recreation services	0.2829	0.1410	0.1199	0.5439

Table I.7 Value Added Multipliers for Lower Laguna Madre

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.4749	0.0649	0.2266	0.7664
2	Beef	0.5658	0.0700	0.2411	0.8769
3	Other meat animals and livestock products	0.2438	0.0894	0.1019	0.4350
4	Cotton	0.5369	0.2512	0.2724	1.0605
5	Food grains	0.3553	0.2016	0.1534	0.7103
6	Feed crops	0.5053	0.1399	0.1825	0.8277
7	Fruits and tree nuts	0.3639	0.3021	0.2080	0.8740
8	Vegetables	0.6895	0.1614	0.2168	1.0677
9	Sugar and misc. crops	0.5855	0.2198	0.2356	1.0409
10	Oil bearing crops	0.3340	0.2391	0.1667	0.7399
11	Commercial fishing	0.7738	0.0505	0.1593	0.9836
12	Natural gas&crude petroleum	0.6143	0.2354	0.1669	1.0166
13	Natural gas liquids	0.9201	0.0516	0.0338	1.0050
14	Stone, sand, gravel and chemical mining	0.7125	0.0892	0.1784	0.9802
15	New highways and streets	0.4262	0.1294	0.1818	0.7374
16	New mineral extraction facilities	0.9377	0.0154	0.3722	1.3253
17	Seafood	0.1591	0.2129	0.1146	0.4866
18	Misc. food preparations except seafood	0.2702	0.1649	0.1076	0.5427
19	Chemical products	0.5315	0.1049	0.1490	0.7854
20	Petroleum refining, paving, etc	0.2108	0.1372	0.0734	0.4214
21	Ship and boat building and repairing	0.3894	0.0937	0.1694	0.6525
22	Railroads and related services	0.4855	0.1948	0.2199	0.9003
23	Motor freight transport and warehousing	0.3472	0.3555	0.2168	0.9195
24	Water transportation	0.1492	0.2441	0.1224	0.5157
25	Air transportation	0.4129	0.1941	0.1747	0.7817
26	Pipelines, except natural gas	0.6240	0.1453	0.0830	0.8523
27	Transportation services	0.4883	0.2069	0.2741	0.9693
28	Food stores, eating and drinking	0.5863	0.1392	0.2449	0.9704
29	Automotive dealers and service stations	0.7331	0.1303	0.2710	1.1344
30	Miscellaneous retail	0.7901	0.1008	0.2799	1.1708
31	Hotels and lodging places	0.5942	0.1583	0.2359	0.9884
32	Amusement and recreation services	0.3788	0.2349	0.2098	0.8235

Table I.8 Employment Multipliers for Lower Laguna Madre Area

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	14	4	6	24
2	Beef	17	3	7	27
3	Other meat animals and livestock products	49	5	3	58
4	Cotton	12	24	8	43
5	Food grains	37	7	4	49
6	Feed crops	30	5	5	41
7	Fruits and tree nuts	26	25	6	57
8	Vegetables	18	12	6	37
9	Sugar and misc. crops	24	11	7	42
10	Oil bearing crops	33	11	5	48
11	Commercial fishing	25	1	5	32
12	Natural gas&crude petroleum	5	5	5	15
13	Natural gas liquids	1	1	1	3
14	Stone, sand, gravel and chemical mining	11	2	5	18
15	New highways and streets	14	4	5	23
16	New mineral extraction facilities	32	0	11	43
17	Seafood	7	7	3	17
18	Misc. food preparations except seafood	8	5	3	16
19	Chemical products	5	2	4	12
20	Petroleum refining, paving, etc	3	2	2	6
21	Ship and boat building and repairing	14	2	5	21
22	Railroads and related services	7	6	6	19
23	Motor freight transport and warehousing	14	12	6	32
24	Water transportation	6	6	4	15
25	Air transportation	7	5	5	18
26	Pipelines, except natural gas	2	3	2	8
27	Transportation services	12	5	8	24
28	Food stores, eating and drinking	31	4	7	42
29	Automotive dealers and service stations	20	3	8	30
30	Miscellaneous retail	44	2	8	54
31	Hotels and lodging places	23	5	7	35
32	Amusement and recreation services	20	8	6	33

Table I.9 Output Multipliers for Texas State

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	1.0000	0.1840	0.4767	1.6607
2	Beef	1.0000	0.3083	0.3933	1.7016
3	Other meat animals and livestock products	1.0000	0.1654	0.4333	1.5987
4	Cotton	1.0000	0.4429	0.5406	1.9834
5	Food grains	1.0000	0.4541	0.3932	1.8473
6	Feed crops	1.0000	0.2473	0.4214	1.6686
7	Fruits and tree nuts	1.0000	0.2496	0.4606	1.7102
8	Vegetables	1.0000	0.0779	0.4179	1.4958
9	Sugar and misc. crops	1.0000	0.3371	0.5716	1.9087
10	Oil bearing crops	1.0000	0.3806	0.4465	1.8271
11	Commercial fishing	1.0000	0.2186	0.3801	1.5987
12	Natural gas&crude petroleum	1.0000	0.3412	0.3385	1.6797
13	Natural gas liquids	1.0000	0.0699	0.0696	1.1395
14	Stone, sand, gravel and chemical mining	1.0000	0.3309	0.4491	1.7799
15	New highways and streets	1.0000	0.3746	0.4731	1.8477
16	New mineral extraction facilities	1.0000	0.0435	0.7727	1.8162
17	Seafood	1.0000	0.4145	0.2840	1.6985
18	Misc. food preparations except seafood	1.0000	0.4014	0.2830	1.6844
19	Chemical products	1.0000	0.6466	0.3929	2.0394
20	Petroleum refining, paving, etc	1.0000	0.3905	0.1739	1.5644
21	Ship and boat building and repairing	1.0000	0.2416	0.5339	1.7755
22	Railroads and related services	1.0000	0.5785	0.5442	2.1227
23	Motor freight transport and warehousing	1.0000	0.7988	0.5197	2.3185
24	Water transportation	1.0000	0.7239	0.3928	2.1166
25	Air transportation	1.0000	0.5124	0.4491	1.9615
26	Pipelines, except natural gas	1.0000	0.3990	0.2232	1.6223
27	Transportation services	1.0000	0.4764	0.6321	2.1085
28	Food stores, eating and drinking	1.0000	0.3951	0.5714	1.9665
29	Automotive dealers and service stations	1.0000	0.2808	0.6255	1.9063
30	Miscellaneous retail	1.0000	0.2196	0.6258	1.8454
31	Hotels and lodging places	1.0000	0.3981	0.5768	1.9749
32	Amusement and recreation services	1.0000	0.5271	0.6259	2.1531

Table I.10 Personal Income Multipliers for Texas State

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.3920	0.0603	0.1652	0.6175
2	Beef	0.2817	0.0915	0.1363	0.5094
3	Other meat animals and livestock products	0.3593	0.0517	0.1501	0.5612
4	Cotton	0.3364	0.1765	0.1873	0.7002
5	Food grains	0.2546	0.1185	0.1362	0.5093
6	Feed crops	0.3321	0.0677	0.1460	0.5458
7	Fruits and tree nuts	0.3442	0.0928	0.1596	0.5966
8	Vegetables	0.3679	0.0286	0.1448	0.5413
9	Sugar and misc. crops	0.4254	0.1169	0.1981	0.7404
10	Oil bearing crops	0.3166	0.1070	0.1547	0.5783
11	Commercial fishing	0.3026	0.0580	0.1317	0.4923
12	Natural gas&crude petroleum	0.1828	0.1384	0.1173	0.4385
13	Natural gas liquids	0.0417	0.0243	0.0241	0.0901
14	Stone, sand, gravel and chemical mining	0.3230	0.1030	0.1556	0.5816
15	New highways and streets	0.3220	0.1269	0.1639	0.6128
16	New mineral extraction facilities	0.7196	0.0136	0.2677	1.0008
17	Seafood	0.1320	0.1374	0.0984	0.3678
18	Misc. food preparations except seafood	0.1523	0.1162	0.0980	0.3665
19	Chemical products	0.1956	0.1771	0.1361	0.5088
20	Petroleum refining, paving, etc	0.0737	0.0912	0.0602	0.2252
21	Ship and boat building and repairing	0.4339	0.0726	0.1850	0.6915
22	Railroads and related services	0.3186	0.1977	0.1886	0.7049
23	Motor freight transport and warehousing	0.2422	0.2509	0.1800	0.6731
24	Water transportation	0.1364	0.2362	0.1361	0.5087
25	Air transportation	0.2473	0.1788	0.1556	0.5817
26	Pipelines, except natural gas	0.0870	0.1247	0.0773	0.2891
27	Transportation services	0.4304	0.1693	0.2190	0.8187
28	Food stores, eating and drinking	0.4209	0.1213	0.1980	0.7401
29	Automotive dealers and service stations	0.4940	0.0995	0.2167	0.8101
30	Miscellaneous retail	0.5165	0.0772	0.2168	0.8105
31	Hotels and lodging places	0.3923	0.1549	0.1998	0.7471
32	Amusement and recreation services	0.4049	0.1890	0.2169	0.8107

Table I.11 Value Added Multipliers for Texas State

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	0.4813	0.1078	0.2797	0.8688
2	Beef	0.3930	0.1602	0.2308	0.7840
3	Other meat animals and livestock products	0.5775	0.0933	0.2542	0.9250
4	Cotton	0.5846	0.2459	0.3172	1.1476
5	Food grains	0.5223	0.2358	0.2307	0.9888
6	Feed crops	0.7144	0.1309	0.2472	1.0925
7	Fruits and tree nuts	0.7698	0.1333	0.2703	1.1733
8	Vegetables	0.9245	0.0426	0.2452	1.2122
9	Sugar and misc. crops	0.6806	0.1887	0.3354	1.2047
10	Oil bearing crops	0.6429	0.2067	0.2620	1.1116
11	Commercial fishing	0.7738	0.0992	0.2230	1.0960
12	Natural gas&crude petroleum	0.6143	0.2320	0.1986	1.0449
13	Natural gas liquids	0.9201	0.0505	0.0408	1.0114
14	Stone, sand, gravel and chemical mining	0.6411	0.1737	0.2635	1.0783
15	New highways and streets	0.5065	0.1935	0.2776	0.9776
16	New mineral extraction facilities	0.9377	0.0236	0.4534	1.4146
17	Seafood	0.1832	0.2235	0.1666	0.5733
18	Misc. food preparations except seafood	0.4023	0.1966	0.1660	0.7650
19	Chemical products	0.4354	0.3154	0.2305	0.9813
20	Petroleum refining, paving, etc	0.2159	0.2322	0.1020	0.5502
21	Ship and boat building and repairing	0.5398	0.1206	0.3132	0.9736
22	Railroads and related services	0.4908	0.3012	0.3193	1.1113
23	Motor freight transport and warehousing	0.3866	0.4023	0.3049	1.0938
24	Water transportation	0.2068	0.3493	0.2304	0.7866
25	Air transportation	0.4402	0.2707	0.2635	0.9744
26	Pipelines, except natural gas	0.6240	0.2175	0.1310	0.9725
27	Transportation services	0.5148	0.2583	0.3709	1.1439
28	Food stores, eating and drinking	0.5806	0.2049	0.3353	1.1207
29	Automotive dealers and service stations	0.7331	0.1683	0.3670	1.2684
30	Miscellaneous retail	0.7901	0.1312	0.3672	1.2885
31	Hotels and lodging places	0.6100	0.2264	0.3384	1.1749
32	Amusement and recreation services	0.4773	0.2862	0.3672	1.1308

Table I.12 Employment Multipliers for Texas State

Number	Sector	Direct	Indirect	Induced	Total
1	Dairy farm products	10	5	7	22
2	Beef	13	6	6	24
3	Other meat animals and livestock products	67	5	6	78
4	Cotton	10	12	8	30
5	Food grains	32	5	6	43
6	Feed crops	45	3	6	54
7	Fruits and tree nuts	25	6	6	37
8	Vegetables	16	2	6	24
9	Sugar and misc. crops	22	6	8	36
10	Oil bearing crops	31	6	6	43
11	Commercial fishing	28	2	5	35
12	Natural gas&crude petroleum	3	5	5	12
13	Natural gas liquids	1	1	1	3
14	Stone, sand, gravel and chemical mining	8	3	6	17
15	New highways and streets	11	4	7	21
16	New mineral extraction facilities	21	0	11	32
17	Seafood	7	6	4	17
18	Misc. food preparations except seafood	4	4	4	13
19	Chemical products	2	4	5	12
20	Petroleum refining, paving, etc	1	2	2	6
21	Ship and boat building and repairing	11	2	7	21
22	Railroads and related services	7	6	8	20
23	Motor freight transport and warehousing	13	10	7	30
24	Water transportation	5	7	5	18
25	Air transportation	7	5	6	18
26	Pipelines, except natural gas	2	4	3	9
27	Transportation services	10	5	9	24
28	Food stores, eating and drinking	29	4	8	42
29	Automotive dealers and service stations	17	3	9	28
30	Miscellaneous retail	41	2	9	52
31	Hotels and lodging places	20	6	8	34
32	Amusement and recreation services	20	8	9	37

APPENDIX II. Detailed Total Impacts on the GIWW Region and Texas

Table II.1 Estimated Output Impact for GIWW Region (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	1.17	0.16	0.49	1.82
2	Beef	43.54	5.57	19.44	68.54
3	Other meat animals and livestock products	1.40	0.26	0.28	1.94
4	Cotton	113.15	57.00	58.21	228.36
5	Food grains	0.01	0.01	0.00	0.02
6	Feed crops	102.81	35.52	35.41	173.74
7	Fruits and tree nuts	19.95	14.30	8.35	42.60
8	Vegetables	112.65	40.12	47.15	199.92
9	Sugar and misc. crops	92.34	42.95	42.23	177.52
10	Oil bearing crops	0.61	0.36	0.21	1.18
11-Case1	Commercial fishing (Inshore)	1.60	0.30	0.50	2.40
11-Case2	Commercial fishing(Inshore + offshore)	2.40	0.46	0.75	3.60
11-Case 3	Commercial fishing(From all gulf-Lower LM)	63.10	11.97	19.70	94.77
11-Case4	Commercial fishing(From all gulf-Total LM)	65.20	12.37	20.36	97.92
12	Natural gas&crude petroleum	21.14	7.70	6.77	35.61
13	Natural gas liquids	8.11	0.60	0.52	9.24
14	Stone, sand, gravel and chemical mining	1.40	0.29	0.50	2.20
15	New highways and streets	109.16	38.36	41.82	189.34
16	New mineral extraction facilities	134.78	4.65	92.65	232.07
17	Seafood	10.30	4.27	2.29	16.86
18	Misc. food preparations except seafood	90.01	38.05	19.10	147.15
19	Chemical products	482.11	282.04	137.93	902.08
20	Petroleum refining, paving, etc	791.80	250.68	102.62	1145.10
21	Ship and boat building and repairing	15.22	3.95	5.19	24.37
22	Railroads and related services	24.92	12.70	11.11	48.74
23	Motor freight transport and warehousing	110.91	89.30	47.45	247.65
24	Water transportation	50.60	34.35	13.59	98.53
25	Air transportation	155.80	75.92	53.78	285.50
26	Pipelines, except natural gas	7.04	2.52	1.25	10.81
27	Transportation services	8.76	3.85	4.63	17.24
28	Food stores, eating and drinking	70.06	22.36	33.15	125.58
29	Automotive dealers and service stations	90.58	23.40	47.52	161.50
30	Miscellaneous retail	59.38	11.98	31.83	103.19
31	Hotels and lodging places	32.63	11.76	15.24	59.63
32	Amusement and recreation services	44.55	21.31	18.54	84.40

Table II.2 Estimated Personal Income Impact for GIWW Region (Total Laguna Madre)

Number	Sector	Direct \$MM	Indirect \$MM	Induced \$MM	Total \$MM
1	Dairy farm products	0.48	0.05	0.16	0.69
2	Beef	19.14	1.68	6.36	27.18
3	Other meat animals and livestock products	0.23	0.07	0.09	0.39
4	Cotton	40.14	22.22	19.04	81.41
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	29.21	8.73	11.58	49.51
7	Fruits and tree nuts	3.75	5.20	2.73	11.67
8	Vegetables	36.17	14.34	15.42	65.94
9	Sugar and misc. crops	31.39	13.85	13.81	59.05
10	Oil bearing crops	0.13	0.09	0.07	0.29
11-Case1	Commercial fishing (Inshore)	0.46	0.07	0.16	0.70
11-Case2	Commercial fishing(Inshore + offshore)	0.70	0.11	0.25	1.05
11-Case 3	Commercial fishing(From all gulf-Lower LM)	18.33	2.78	6.44	27.55
11-Case4	Commercial fishing(From all gulf-Total LM)	18.94	2.87	6.66	28.47
12	Natural gas&crude petroleum	3.98	3.28	2.22	9.47
13	Natural gas liquids	0.34	0.22	0.17	0.73
14	Stone, sand, gravel and chemical mining	0.45	0.08	0.16	0.70
15	New highways and streets	32.78	12.02	13.68	58.48
16	New mineral extraction facilities	98.00	1.24	30.30	129.55
17	Seafood	1.18	1.27	-0.75	3.20
18	Misc. food preparations except seafood	10.51	9.95	6.25	26.71
19	Chemical products	81.67	66.10	45.13	192.84
20	Petroleum refining, paving, etc	52.73	57.17	33.57	143.47
21	Ship and boat building and repairing	4.48	1.08	1.70	7.26
22	Railroads and related services	7.88	4.02	3.64	15.54
23	Motor freight transport and warehousing	24.77	26.06	15.52	66.34
24	Water transportation	4.88	9.67	4.44	19.00
25	Air transportation	33.95	23.67	17.59	75.20
26	Pipelines, except natural gas	0.60	0.74	0.41	1.75
27	Transportation services	3.72	1.24	1.51	6.47
28	Food stores, eating and drinking	29.15	6.37	10.85	46.37
29	Automotive dealers and service stations	43.31	7.60	15.54	66.44
30	Miscellaneous retail	30.25	3.85	10.41	44.51
31	Hotels and lodging places	12.21	4.12	4.99	21.32
32	Amusement and recreation services	13.48	6.38	6.06	25.92

Table II.3 Estimated Value Added Impact for GIWW Region (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.55	0.08	0.28	0.92
2	Beef	24.53	2.91	11.18	38.62
3	Other meat animals and livestock products	0.38	0.13	0.16	0.67
4	Cotton	66.03	30.04	33.49	129.56
5	Food grains	0.01	0.00	0.00	0.01
6	Feed crops	56.50	17.65	20.37	94.53
7	Fruits and tree nuts	7.26	7.34	4.80	19.40
8	Vegetables	77.67	20.92	27.12	125.71
9	Sugar and misc. crops	54.62	22.72	24.28	101.63
10	Oil bearing crops	0.20	0.18	0.12	0.51
11-Case1	Commercial fishing (Inshore)	1.24	0.13	0.29	1.65
11-Case2	Commercial fishing(Inshore + offshore)	1.86	0.19	0.43	2.48
11-Case3	Commercial fishing(From all gulf-Lower LM)	48.83	5.01	11.33	65.17
11-Case4	Commercial fishing(From all gulf-Total LM)	50.45	5.18	11.71	67.34
12	Natural gas&crude petroleum	12.98	5.31	3.90	22.19
13	Natural gas liquids	7.46	0.44	0.30	8.20
14	Stone, sand, gravel and chemical mining	1.03	0.14	0.29	1.47
15	New highways and streets	51.02	18.63	24.05	93.72
16	New mineral extraction facilities	126.39	2.40	53.29	182.08
17	Seafood	1.64	2.28	-1.32	5.24
18	Misc. food preparations except seafood	24.02	16.72	10.98	51.73
19	Chemical products	203.74	127.57	79.36	410.66
20	Petroleum refining, paving, etc	163.43	145.85	58.99	368.27
21	Ship and boat building and repairing	6.14	1.87	2.99	11.00
22	Railroads and related services	12.17	6.19	6.39	24.75
23	Motor freight transport and warehousing	39.57	42.48	27.29	109.34
24	Water transportation	7.87	14.99	7.81	30.67
25	Air transportation	63.74	36.80	30.93	131.46
26	Pipelines, except natural gas	4.39	1.32	0.72	6.43
27	Transportation services	4.29	1.96	2.66	8.91
28	Food stores, eating and drinking	40.59	11.30	19.07	70.96
29	Automotive dealers and service stations	66.40	13.33	27.33	107.07
30	Miscellaneous retail	46.92	6.79	18.31	72.02
31	Hotels and lodging places	19.43	6.29	8.77	34.50
32	Amusement and recreation services	18.12	10.63	10.67	39.42

Table II.4 Estimated Employment Impact for GIWW Region (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		Jobs/\$MM	Jobs/\$MM	Jobs/\$MM	Jobs/\$MM
1	Dairy farm products	15	4	8	27
2	Beef	740	131	305	1176
3	Other meat animals and livestock products	70	6	4	80
4	Cotton	1358	2263	905	4526
5	Food grains	0	0	0	1
6	Feed crops	2879	514	514	4009
7	Fruits and tree nuts	519	479	120	1137
8	Vegetables	2028	1352	676	4055
9	Sugar and misc. crops	2216	923	646	3786
10	Oil bearing crops	20	7	3	30
11-Case1	Commercial fishing (Inshore)	42	3	8	51
11-Case2	Commercial fishing(Inshore + offshore)	62	5	12	77
11-Case3	Commercial fishing(From all gulf-Lower LM)	1641	126	316	2019
11-Case4	Commercial fishing(From all gulf-Total LM)	1695	130	326	2086
12	Natural gas&crude petroleum	85	127	106	296
13	Natural gas liquids	8	8	8	24
14	Stone, sand, gravel and chemical mining	15	3	8	25
15	New highways and streets	1310	437	655	2402
16	New mineral extraction facilities	3504	0	1483	4987
17	Seafood	72	62	31	175
18	Misc. food preparations except seafood	720	450	270	1530
19	Chemical products	964	1928	1928	5303
20	Petroleum refining, paving, etc	792	1584	1584	3959
21	Ship and boat building and repairing	198	46	76	320
22	Railroads and related services	174	150	174	498
23	Motor freight transport and warehousing	1442	1331	776	3549
24	Water transportation	304	354	202	860
25	Air transportation	1091	935	779	2804
26	Pipelines, except natural gas	14	28	21	63
27	Transportation services	96	44	70	219
28	Food stores, eating and drinking	2172	280	490	2943
29	Automotive dealers and service stations	1721	272	725	2717
30	Miscellaneous retail	2613	178	475	3266
31	Hotels and lodging places	750	196	228	1175
32	Amusement and recreation services	936	312	267	1515

Table II.5 Estimated Output Impact for GIWW Region (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	1.13	0.14	0.43	1.70
2	Beef	40.87	5.48	16.74	63.09
3	Other meat animals and livestock products	0.99	0.19	0.17	1.36
4	Cotton	76.47	34.93	35.39	146.78
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	77.81	20.63	24.12	122.56
7	Fruits and tree nuts	19.95	11.17	7.05	38.17
8	Vegetables	112.61	33.74	41.47	187.81
9	Sugar and misc. crops	91.83	37.23	36.76	165.82
10	Oil bearing crops	0.61	0.27	0.17	1.05
11-Case1	Commercial fishing (Inshore)	1.60	0.16	0.43	2.20
11-Case2	Commercial fishing(Inshore + offshore)	2.40	0.25	0.65	3.30
11-Case3	Commercial fishing(From all gulf-Lower LM)	63.10	6.48	17.08	86.66
11-Case4	Commercial fishing(From all gulf-Total LM)	0.00	0.00	0.00	0.00
12	Natural gas&crude petroleum	4.25	1.41	1.20	6.86
13	Natural gas liquids	2.43	0.17	0.14	2.74
14	Stone, sand, gravel and chemical mining	0.97	0.18	0.29	1.44
15	New highways and streets	69.29	17.65	21.40	108.33
16	New mineral extraction facilities	64.45	1.89	40.76	107.09
17	Seafood	6.92	2.75	1.35	11.02
18	Misc. food preparations except seafood	65.53	25.06	11.99	102.57
19	Chemical products	189.06	40.40	47.87	277.33
20	Petroleum refining, paving, etc	484.71	108.14	60.44	653.29
21	Ship and boat building and repairing	10.06	1.91	2.89	14.87
22	Railroads and related services	16.61	6.66	6.21	29.48
23	Motor freight transport and warehousing	72.12	53.26	26.56	151.94
24	Water transportation	28.97	16.21	6.02	51.21
25	Air transportation	91.73	33.86	27.22	152.81
26	Pipelines, except natural gas	3.20	0.91	0.45	4.56
27	Transportation services	8.41	3.38	3.92	15.70
28	Food stores, eating and drinking	40.24	11.15	16.74	68.13
29	Automotive dealers and service stations	54.59	12.28	25.13	92.01
30	Miscellaneous retail	50.83	8.90	24.16	83.90
31	Hotels and lodging places	18.12	5.31	7.26	30.69
32	Amusement and recreation services	21.88	10.55	7.80	40.23

Table II.6 Estimated Personal Income Impact for GIWW Region (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.47	0.05	0.15	0.66
2	Beef	18.13	1.78	5.63	25.54
3	Other meat animals and livestock products	0.15	0.05	0.06	0.26
4	Cotton	26.78	15.31	11.91	54.00
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	23.16	5.53	8.12	36.81
7	Fruits and tree nuts	3.75	4.64	2.37	10.76
8	Vegetables	36.16	13.16	13.95	63.28
9	Sugar and misc. crops	30.97	12.76	12.37	56.09
10	Oil bearing crops	0.13	0.07	0.06	0.26
11-Case1	Commercial fishing (Inshore)	0.46	0.05	0.15	0.66
11-Case2	Commercial fishing(Inshore + offshore)	0.70	0.08	0.22	0.99
11-Case3	Commercial fishing(From all gulf-Lower LM)	18.32	2.00	5.75	26.06
11-Case4	Commercial fishing(From all gulf-Total LM)	0.00	0.00	0.00	0.00
12	Natural gas&crude petroleum	0.81	0.63	0.41	1.84
13	Natural gas liquids	0.10	0.06	0.05	0.21
14	Stone, sand, gravel and chemical mining	0.30	0.05	0.10	0.45
15	New highways and streets	19.50	5.95	7.20	32.66
16	New mineral extraction facilities	47.97	0.50	13.71	62.19
17	Seafood	0.79	0.81	-0.45	2.06
18	Misc. food preparations except seafood	7.75	6.50	4.03	18.28
19	Chemical products	45.19	11.75	16.11	73.04
20	Petroleum refining, paving, etc	47.56	24.34	20.34	92.25
21	Ship and boat building and repairing	2.89	0.55	0.97	4.42
22	Railroads and related services	5.22	2.16	2.09	9.47
23	Motor freight transport and warehousing	15.67	15.92	8.94	40.53
24	Water transportation	2.66	4.51	2.03	9.19
25	Air transportation	20.32	12.05	9.16	41.53
26	Pipelines, except natural gas	0.27	0.26	0.15	0.69
27	Transportation services	3.56	1.10	1.32	5.98
28	Food stores, eating and drinking	16.80	3.12	5.63	25.55
29	Automotive dealers and service stations	25.88	4.01	8.46	38.35
30	Miscellaneous retail	25.87	2.88	8.13	36.88
31	Hotels and lodging places	6.75	1.88	2.44	11.08
32	Amusement and recreation services	6.19	3.09	2.62	11.90

Table II.7 Estimated Value Added Impact for GIWW Region (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.54	0.07	0.26	0.86
2	Beef	23.13	2.86	9.85	35.84
3	Other meat animals and livestock products	0.24	0.09	0.10	0.43
4	Cotton	41.06	19.21	20.83	81.10
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	39.32	10.89	14.20	64.40
7	Fruits and tree nuts	7.26	6.03	4.15	17.44
8	Vegetables	77.64	18.18	24.41	120.23
9	Sugar and misc. crops	53.77	20.19	21.64	95.59
10	Oil bearing crops	0.20	0.15	0.10	0.45
11-Case1	Commercial fishing (Inshore)	1.24	0.08	0.25	1.57
11-Case2	Commercial fishing(Inshore + offshore)	1.86	0.12	0.38	2.36
11-Case3	Commercial fishing(From all gulf-Lower LM)	48.83	3.19	10.05	62.07
11-Case4	Commercial fishing(From all gulf-Total LM)	0.00	0.00	0.00	0.00
12	Natural gas&crude petroleum	2.61	1.00	0.71	4.32
13	Natural gas liquids	2.24	0.13	0.08	2.44
14	Stone, sand, gravel and chemical mining	0.69	0.09	0.17	0.95
15	New highways and streets	29.53	8.97	12.60	51.09
16	New mineral extraction facilities	60.43	0.99	23.99	85.42
17	Seafood	1.10	1.47	-0.79	3.37
18	Misc. food preparations except seafood	17.71	10.81	7.05	35.56
19	Chemical products	100.48	19.83	28.17	148.49
20	Petroleum refining, paving, etc	102.18	66.50	35.58	204.25
21	Ship and boat building and repairing	3.92	0.94	1.70	6.56
22	Railroads and related services	8.06	3.24	3.65	14.96
23	Motor freight transport and warehousing	25.04	25.64	15.64	66.32
24	Water transportation	4.32	7.07	3.55	14.94
25	Air transportation	37.88	17.81	16.03	71.71
26	Pipelines, except natural gas	2.00	0.47	0.27	2.73
27	Transportation services	4.11	1.74	2.30	8.15
28	Food stores, eating and drinking	23.59	5.60	9.85	39.05
29	Automotive dealers and service stations	40.02	7.11	14.79	61.93
30	Miscellaneous retail	40.16	5.12	14.23	59.51
31	Hotels and lodging places	10.77	2.87	4.27	17.91
32	Amusement and recreation services	8.29	5.14	4.59	18.02

Table II.8 Estimated Employment Impact for GIWW Region (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		Jobs/\$MM	Jobs/\$MM	Jobs/\$MM	Jobs/\$MM
1	Dairy farm products	16	5	7	27
2	Beef	695	123	286	1104
3	Other meat animals and livestock products	49	5	3	57
4	Cotton	918	1835	612	3288
5	Food grains	0	0	0	0
6	Feed crops	2334	389	389	3190
7	Fruits and tree nuts	519	499	120	1137
8	Vegetables	2027	1351	676	4167
9	Sugar and misc. crops	2204	1010	643	3857
10	Oil bearing crops	20	7	3	29
11-Case1	Commercial fishing (Inshore)	40	2	8	51
11-Case2	Commercial fishing(Inshore + offshore)	60	2	12	77
11-Case3	Commercial fishing(From all gulf-Lower LM)	1578	63	316	2019
11-Case4	Commercial fishing(From all gulf-Total LM)	0	0	0	0
12	Natural gas&crude petroleum	21	21	21	64
13	Natural gas liquids	2	2	2	7
14	Stone, sand, gravel and chemical mining	11	2	5	17
15	New highways and streets	970	277	346	1594
16	New mineral extraction facilities	2062	0	709	2771
17	Seafood	48	48	21	118
18	Misc. food preparations except seafood	524	328	197	1048
19	Chemical products	945	378	756	2269
20	Petroleum refining, paving, etc	1454	969	969	2908
21	Ship and boat building and repairing	141	20	50	211
22	Railroads and related services	116	100	100	316
23	Motor freight transport and warehousing	1010	865	433	2308
24	Water transportation	174	174	116	435
25	Air transportation	642	459	459	1651
26	Pipelines, except natural gas	6	10	6	26
27	Transportation services	101	42	67	202
28	Food stores, eating and drinking	1247	161	282	1690
29	Automotive dealers and service stations	1092	164	437	1638
30	Miscellaneous retail	2237	102	407	2745
31	Hotels and lodging places	417	91	127	634
32	Amusement and recreation services	438	175	131	722

Table II.9 Estimated Output Impact for Texas State (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	1.17	0.22	0.56	1.94
2	Beef	43.54	13.42	17.12	74.09
3	Other meat animals and livestock products	1.40	0.23	0.61	2.24
4	Cotton	113.15	50.11	61.17	224.41
5	Food grains	0.01	0.01	0.00	0.02
6	Feed crops	102.81	25.42	43.32	171.54
7	Fruits and tree nuts	19.95	4.98	9.19	34.12
8	Vegetables	112.65	8.78	47.07	168.49
9	Sugar and misc. crops	92.34	31.13	52.78	176.24
10	Oil bearing crops	0.61	0.23	0.27	1.11
11-Case1	Commercial fishing (Inshore)	1.60	0.35	0.61	2.56
11-Case2	Commercial fishing(Inshore + offshore)	2.40	0.52	0.91	3.84
11-Case3	Commercial fishing(From all gulf-Lower LM)	63.10	13.79	23.98	100.88
11-Case4	Commercial fishing(From all gulf-Total LM)	65.20	14.25	24.78	104.24
12	Natural gas&crude petroleum	21.14	7.21	7.15	35.50
13	Natural gas liquids	8.11	0.57	0.56	9.24
14	Stone, sand, gravel and chemical mining	1.40	0.46	0.63	2.50
15	New highways and streets	109.16	40.89	51.65	201.70
16	New mineral extraction facilities	134.78	5.86	104.15	244.79
17	Seafood	10.30	4.27	2.92	17.49
18	Misc. food preparations except seafood	90.01	36.13	25.47	151.61
19	Chemical products	482.11	311.73	189.42	983.22
20	Petroleum refining, paving, etc	791.80	309.20	137.69	1238.69
21	Ship and boat building and repairing	15.22	3.68	8.13	27.03
22	Railroads and related services	24.92	14.42	13.56	52.90
23	Motor freight transport and warehousing	110.91	88.59	57.64	257.14
24	Water transportation	50.60	36.63	19.88	107.10
25	Air transportation	155.80	79.83	69.97	305.59
26	Pipelines, except natural gas	7.04	2.81	1.57	11.42
27	Transportation services	8.76	4.17	5.54	18.47
28	Food stores, eating and drinking	70.06	27.68	40.03	137.77
29	Automotive dealers and service stations	90.58	25.43	56.66	172.67
30	Miscellaneous retail	59.38	13.04	37.16	109.58
31	Hotels and lodging places	32.63	12.99	18.82	64.44
32	Amusement and recreation services	44.55	23.48	27.88	95.92

Table II.10 Estimated Personal Income Impact for Texas State (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.46	0.07	0.19	0.72
2	Beef	12.26	3.98	5.93	22.18
3	Other meat animals and livestock products	0.50	0.07	0.21	0.79
4	Cotton	38.06	19.97	21.19	79.22
5	Food grains	0.00	0.00	0.00	0.01
6	Feed crops	34.14	6.96	15.01	56.11
7	Fruits and tree nuts	6.87	1.85	3.18	11.90
8	Vegetables	41.44	3.22	16.31	60.97
9	Sugar and misc. crops	39.28	10.79	18.29	68.37
10	Oil bearing crops	0.19	0.07	0.09	0.35
11-Case1	Commercial fishing (Inshore)	0.48	0.09	0.21	0.79
11-Case3	Commercial fishing(From all gulf-Lower LM)	0.73	0.14	0.32	1.18
11-Case4	Commercial fishing(From all gulf-Total LM)	19.09	3.66	8.31	31.06
11-Case3	Commercial fishing(From all gulf)	19.73	3.78	8.59	32.10
12	Natural gas&crude petroleum	3.86	2.93	2.48	9.27
13	Natural gas liquids	0.34	0.20	0.20	0.73
14	Stone, sand, gravel and chemical mining	0.45	0.14	0.22	0.82
15	New highways and streets	35.15	13.85	17.89	66.90
16	New mineral extraction facilities	96.99	1.83	36.08	134.89
17	Seafood	1.36	1.41	1.01	3.79
18	Misc. food preparations except seafood	13.71	10.46	8.82	32.99
19	Chemical products	94.30	85.38	65.62	245.30
20	Petroleum refining, paving, etc	58.36	72.21	47.67	178.31
21	Ship and boat building and repairing	6.61	1.11	2.82	10.53
22	Railroads and related services	7.94	4.93	4.70	17.57
23	Motor freight transport and warehousing	26.86	27.83	19.96	74.65
24	Water transportation	6.90	11.95	6.89	25.74
25	Air transportation	38.53	27.86	24.24	90.63
26	Pipelines, except natural gas	0.61	0.88	0.54	2.03
27	Transportation services	3.77	1.48	1.92	7.17
28	Food stores, eating and drinking	29.49	8.50	13.87	51.85
29	Automotive dealers and service stations	44.75	9.01	19.63	73.38
30	Miscellaneous retail	30.67	4.58	12.87	48.13
31	Hotels and lodging places	12.80	5.05	6.52	24.38
32	Amusement and recreation services	18.04	8.42	9.66	36.12

Table II.11 Estimated Value Added Impact for Texas State (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.56	0.13	0.33	1.02
2	Beef	17.11	6.97	10.05	34.13
3	Other meat animals and livestock products	0.81	0.13	0.36	1.29
4	Cotton	66.14	27.82	35.89	129.85
5	Food grains	0.01	0.00	0.00	0.01
6	Feed crops	73.44	13.46	25.41	112.31
7	Fruits and tree nuts	15.36	2.66	5.39	23.41
8	Vegetables	104.14	4.80	27.62	136.55
9	Sugar and misc. crops	62.84	17.42	30.97	111.24
10	Oil bearing crops	0.39	0.13	0.16	0.68
11-Case1	Commercial fishing (Inshore)	1.24	0.16	0.36	1.75
11-Case2	Commercial fishing(Inshore + offshore)	1.86	0.24	0.54	2.63
11-Case3	Commercial fishing(From all gulf-Lower LM)	48.83	6.26	14.07	69.16
11-Case4	Commercial fishing(From all gulf-Total LM)	50.45	6.47	14.54	71.46
12	Natural gas&crude petroleum	12.98	4.90	4.20	22.09
13	Natural gas liquids	7.46	0.41	0.33	8.21
14	Stone, sand, gravel and chemical mining	0.90	0.24	0.37	1.51
15	New highways and streets	55.29	21.12	30.30	106.72
16	New mineral extraction facilities	126.39	3.18	61.11	190.67
17	Seafood	1.89	2.30	1.72	5.90
18	Misc. food preparations except seafood	36.21	17.70	14.94	68.86
19	Chemical products	209.91	152.06	111.13	473.10
20	Petroleum refining, paving, etc	170.95	183.86	80.76	435.65
21	Ship and boat building and repairing	8.22	1.84	4.77	14.82
22	Railroads and related services	12.23	7.51	7.96	27.69
23	Motor freight transport and warehousing	42.88	44.62	33.82	121.31
24	Water transportation	10.46	17.67	11.66	39.80
25	Air transportation	68.58	42.17	41.05	151.81
26	Pipelines, except natural gas	4.39	1.53	0.92	6.84
27	Transportation services	4.51	2.26	3.25	10.02
28	Food stores, eating and drinking	40.68	14.36	23.49	78.52
29	Automotive dealers and service stations	66.40	15.24	33.24	114.89
30	Miscellaneous retail	46.92	7.79	21.80	76.51
31	Hotels and lodging places	19.90	7.39	11.04	38.34
32	Amusement and recreation services	21.26	12.75	16.36	50.38

Table II.12 Estimated Employment Impact for Texas State (Total Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		Jobs/\$MM	Jobs/\$MM	Jobs/\$MM	Jobs/\$MM
1	Dairy farm products	12	6	8	25
2	Beef	554	264	240	1057
3	Other meat animals and livestock products	94	7	8	109
4	Cotton	1123	1392	856	3370
5	Food grains	0	0	0	1
6	Feed crops	4647	331	606	5584
7	Fruits and tree nuts	506	112	129	747
8	Vegetables	1797	202	659	2657
9	Sugar and misc. crops	2060	511	738	3309
10	Oil bearing crops	19	4	4	26
11-Case1	Commercial fishing (Inshore)	45	3	9	57
11-Case2	Commercial fishing(Inshore + offshore)	68	4	13	85
11-Case3	Commercial fishing(From all gulf-Lower LM)	1782	114	336	2231
11-Case4	Commercial fishing(From all gulf-Total LM)	1841	118	347	2306
12	Natural gas&crude petroleum	63	106	106	254
13	Natural gas liquids	8	8	8	24
14	Stone, sand, gravel and chemical mining	12	4	9	25
15	New highways and streets	1158	457	722	2338
16	New mineral extraction facilities	2813	54	1457	4324
17	Seafood	74	62	41	177
18	Misc. food preparations except seafood	388	402	356	1146
19	Chemical products	1191	2158	2650	5999
20	Petroleum refining, paving, etc	677	1903	1926	4505
21	Ship and boat building and repairing	167	33	114	314
22	Railroads and related services	166	153	190	509
23	Motor freight transport and warehousing	1400	1145	806	3351
24	Water transportation	260	363	278	901
25	Air transportation	1073	827	979	2878
26	Pipelines, except natural gas	14	25	22	61
27	Transportation services	85	44	77	207
28	Food stores, eating and drinking	2065	295	560	2920
29	Automotive dealers and service stations	1503	285	793	2581
30	Miscellaneous retail	2430	148	520	3098
31	Hotels and lodging places	647	188	263	1099
32	Amusement and recreation services	907	341	390	1638

Table II.13 Estimated Output Impact for Texas State (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	1.13	0.21	0.54	1.87
2	Beef	40.87	12.60	16.08	69.55
3	Other meat animals and livestock products	0.99	0.16	0.43	1.58
4	Cotton	76.47	33.87	41.34	151.67
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	77.81	19.24	32.79	129.83
7	Fruits and tree nuts	19.95	4.98	9.19	34.12
8	Vegetables	112.61	8.77	47.06	168.44
9	Sugar and misc. crops	91.83	30.96	52.49	175.28
10	Oil bearing crops	0.61	0.23	0.27	1.11
11-Case1	Commercial fishing (Inshore)	1.60	0.35	0.61	2.56
11-Case2	Commercial fishing(Inshore + offshore)	2.40	0.52	0.91	3.84
11-Case3	Commercial fishing(From all gulf-Lower LM)	63.10	13.79	23.98	100.88
11-Case4	Commercial fishing(From all gulf-Total LM)	65.20	14.25	24.78	104.24
12	Natural gas&crude petroleum	4.25	1.45	1.44	7.14
13	Natural gas liquids	2.43	0.17	0.17	2.77
14	Stone, sand, gravel and chemical mining	0.97	0.32	0.43	1.72
15	New highways and streets	69.29	25.96	32.78	128.02
16	New mineral extraction facilities	64.45	2.80	49.80	117.05
17	Seafood	6.92	2.87	1.97	11.76
18	Misc. food preparations except seafood	65.53	26.30	18.54	110.38
19	Chemical products	189.06	122.25	74.28	385.57
20	Petroleum refining, paving, etc	484.71	189.28	84.29	758.27
21	Ship and boat building and repairing	10.06	2.43	5.37	17.86
22	Railroads and related services	16.61	9.61	9.04	35.26
23	Motor freight transport and warehousing	72.12	57.61	37.48	167.22
24	Water transportation	28.97	20.97	11.38	61.33
25	Air transportation	91.73	47.00	41.20	179.94
26	Pipelines, except natural gas	3.20	1.28	0.71	5.20
27	Transportation services	8.41	4.01	5.31	17.73
28	Food stores, eating and drinking	40.24	15.90	22.99	79.13
29	Automotive dealers and service stations	54.59	15.33	34.15	104.06
30	Miscellaneous retail	35.58	7.81	22.27	65.66
31	Hotels and lodging places	18.12	7.21	10.45	35.79
32	Amusement and recreation services	21.88	11.53	13.69	47.11

Table II.14 Estimated Personal Income Impact for Texas State (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		\$MM	\$MM	\$MM	\$MM
1	Dairy farm products	0.44	0.07	0.19	0.70
2	Beef	11.51	3.74	5.57	20.82
3	Other meat animals and livestock products	0.36	0.05	0.15	0.56
4	Cotton	25.72	13.50	14.32	53.54
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	25.84	5.27	11.36	42.47
7	Fruits and tree nuts	6.87	1.85	3.18	11.90
8	Vegetables	41.43	3.22	16.31	60.96
9	Sugar and misc. crops	39.07	10.74	18.19	67.99
10	Oil bearing crops	0.19	0.07	0.09	0.35
11-Case1	Commercial fishing (Inshore)	0.48	0.09	0.21	0.79
11-Case2	Commercial fishing(Inshore + offshore)	0.73	0.14	0.32	1.18
11-Case3	Commercial fishing(From all gulf-Lower LM)	19.09	3.66	8.31	31.06
11-Case4	Commercial fishing(From all gulf-Total LM)	19.73	3.78	8.59	32.10
12	Natural gas&crude petroleum	0.78	0.59	0.50	1.86
13	Natural gas liquids	0.10	0.06	0.06	0.22
14	Stone, sand, gravel and chemical mining	0.31	0.10	0.15	0.56
15	New highways and streets	22.31	8.79	11.36	42.46
16	New mineral extraction facilities	46.38	0.88	17.25	64.50
17	Seafood	0.91	0.95	0.68	2.55
18	Misc. food preparations except seafood	9.98	7.61	6.42	24.02
19	Chemical products	36.98	33.48	25.73	96.19
20	Petroleum refining, paving, etc	35.72	44.21	29.18	109.16
21	Ship and boat building and repairing	4.36	0.73	1.86	6.95
22	Railroads and related services	5.29	3.28	3.13	11.71
23	Motor freight transport and warehousing	17.47	18.10	12.98	48.55
24	Water transportation	3.95	6.84	3.94	14.74
25	Air transportation	22.69	16.40	14.27	53.36
26	Pipelines, except natural gas	0.28	0.40	0.25	0.93
27	Transportation services	3.62	1.42	1.84	6.88
28	Food stores, eating and drinking	16.94	4.88	7.97	29.78
29	Automotive dealers and service stations	26.97	5.43	11.83	44.22
30	Miscellaneous retail	18.38	2.75	7.71	28.84
31	Hotels and lodging places	7.11	2.81	3.62	13.54
32	Amusement and recreation services	8.86	4.14	4.75	17.74

Table II.15 Estimated Value Added Impact for Texas State (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		SMM	SMM	SMM	SMM
1	Dairy farm products	0.54	0.12	0.32	0.98
2	Beef	16.06	6.55	9.43	32.04
3	Other meat animals and livestock products	0.57	0.09	0.25	0.92
4	Cotton	44.70	18.80	24.26	87.76
5	Food grains	0.00	0.00	0.00	0.00
6	Feed crops	55.59	10.19	19.23	85.01
7	Fruits and tree nuts	15.36	2.66	5.39	23.41
8	Vegetables	104.11	4.80	27.61	136.50
9	Sugar and misc. crops	62.50	17.33	30.80	110.63
10	Oil bearing crops	0.39	0.13	0.16	0.68
11-Case1	Commercial fishing (Inshore)	1.24	0.16	0.36	1.75
11-Case2	Commercial fishing(Inshore + offshore)	1.86	0.24	0.54	2.63
11-Case3	Commercial fishing(From all gulf-Lower LM)	48.83	6.26	14.07	69.16
11-Case4	Commercial fishing(From all gulf-Total LM)	50.45	6.47	14.54	71.46
12	Natural gas&crude petroleum	2.61	0.99	0.84	4.44
13	Natural gas liquids	2.24	0.12	0.10	2.46
14	Stone, sand, gravel and chemical mining	0.62	0.17	0.26	1.04
15	New highways and streets	35.09	13.41	19.23	67.74
16	New mineral extraction facilities	60.43	1.52	29.22	91.17
17	Seafood	1.27	1.55	1.15	3.97
18	Misc. food preparations except seafood	26.36	12.88	10.88	50.13
19	Chemical products	82.32	59.63	43.58	185.52
20	Petroleum refining, paving, etc	104.65	112.55	49.44	266.69
21	Ship and boat building and repairing	5.43	1.21	3.15	9.79
22	Railroads and related services	8.15	5.00	5.30	18.46
23	Motor freight transport and warehousing	27.88	29.02	21.99	78.89
24	Water transportation	5.99	10.12	6.68	22.79
25	Air transportation	40.38	24.83	24.17	89.39
26	Pipelines, except natural gas	2.00	0.70	0.42	3.11
27	Transportation services	4.33	2.17	3.12	9.62
28	Food stores, eating and drinking	23.36	8.25	13.49	45.10
29	Automotive dealers and service stations	40.02	9.19	20.03	69.24
30	Miscellaneous retail	28.11	4.67	13.06	45.84
31	Hotels and lodging places	11.05	4.10	6.13	21.29
32	Amusement and recreation services	10.44	6.26	8.03	24.74

Table II.16 Estimated Employment Impact for Texas State (Lower Laguna Madre)

Number	Sector	Direct	Indirect	Induced	Total
		Jobs/\$MM	Jobs/\$MM	Jobs/\$MM	Jobs/\$MM
1	Dairy farm products	11	6	8	24
2	Beef	520	248	225	993
3	Other meat animals and livestock products	66	5	6	77
4	Cotton	759	941	578	2278
5	Food grains	0	0	0	0
6	Feed crops	3517	251	459	4226
7	Fruits and tree nuts	506	112	129	747
8	Vegetables	1796	202	658	2657
9	Sugar and misc. crops	2049	508	734	3291
10	Oil bearing crops	19	4	4	26
11-Case1	Commercial fishing (Inshore)	45	3	9	57
11-Case2	Commercial fishing(Inshore + offshore)	68	4	13	85
11-Case3	Commercial fishing(From all gulf-Lower LM)	1782	114	336	2231
11-Case4	Commercial fishing(From all gulf-Total LM)	1841	118	347	2306
12	Natural gas&crude petroleum	13	21	21	51
13	Natural gas liquids	2	2	2	7
14	Stone, sand, gravel and chemical mining	8	3	6	17
15	New highways and streets	735	290	459	1484
16	New mineral extraction facilities	1345	26	697	2068
17	Seafood	50	42	27	119
18	Misc. food preparations except seafood	282	293	259	834
19	Chemical products	467	846	1039	2352
20	Petroleum refining, paving, etc	414	1165	1179	2758
21	Ship and boat building and repairing	110	22	75	207
22	Railroads and related services	111	102	126	339
23	Motor freight transport and warehousing	910	745	524	2179
24	Water transportation	149	208	159	516
25	Air transportation	632	487	576	1695
26	Pipelines, except natural gas	6	12	10	28
27	Transportation services	82	43	74	198
28	Food stores, eating and drinking	1186	170	322	1677
29	Automotive dealers and service stations	906	172	478	1555
30	Miscellaneous retail	1456	89	311	1856
31	Hotels and lodging places	360	104	146	610
32	Amusement and recreation services	445	167	192	804